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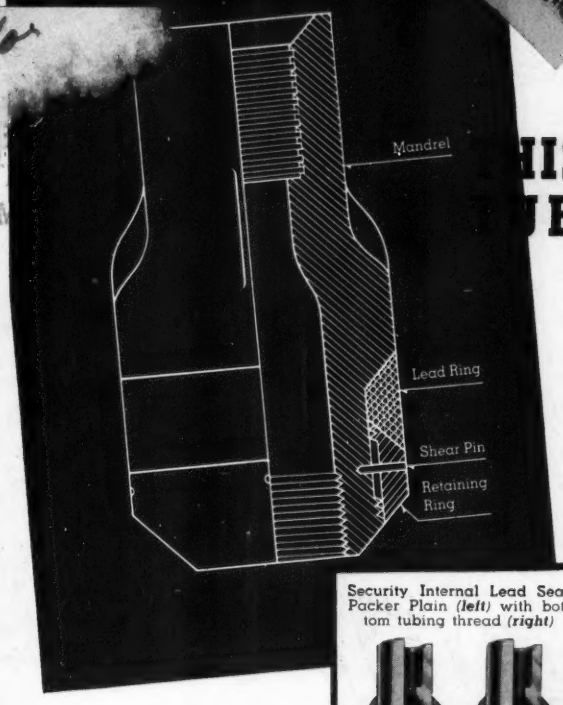
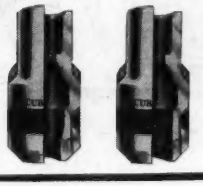


Security Internal Lead Seal Packer Plain *(left)* with bottom tubing thread *(right)*



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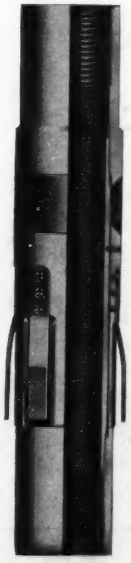
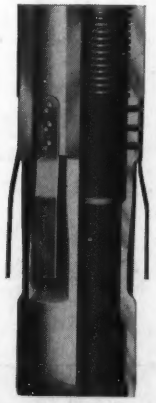
Security Drillable Slip Type Liner Hanger with Lead Seal Packing



Security Drillable Hook Collar Liner Hanger with Lead Seal Packing



Security Drillable Hook Collar Liner Hanger

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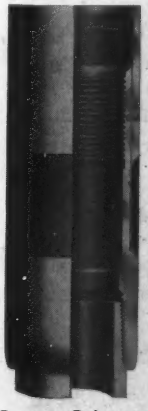

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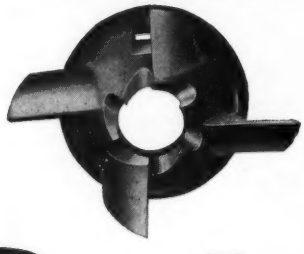

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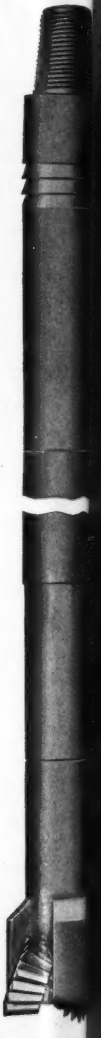

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IN THIS ISSUE

Symposium on Seismograph Exploration 3

Determining Structures from Seismograms 8

Production and Development 12

California Equipment Men Organize Foreign Club 14

West Montebello Oil Field Map 16-17

L. P. St Clair Honored on Retirement 20

Laugh This Off 30

San Joaquin Valley Development 21

Los Angeles Basin Development 24

Coastal District Development 27

Crude Oil Production 32

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Seismograph Prospecting For Oil

Symposium—Parts 4 and 5

By FRANK ITTNER
Seismograph Field Operations

In this section it is proposed to discuss operating methods considered good practice under the various field conditions commonly encountered. Efficient field direction and types of equipment needed to meet transportation problems are considered only to the extent that the desire to produce the best possible records must sometimes give way to the factor of cost. As in all engineering projects, alternative possible methods of operation must be considered in the light of relative costs as well as of the quality of results obtained. Cost may be in the background of much that is done in the field operations, but only the effect on record quality will be considered here.

Record quality at a particular shot point may vary with the various factors of spread character (relative positions of geophones and shot point), shothole depth, formations opposite position of shot, size of charge, the effect of repeat shots, surface geology and culture in the immediate vicinity of the geophones, recorder instrument characteristics, particularly filter.

It is the problem of the field-operating crew to determine and use the most favorable of each of these factors at each shot point. Another important factor, character of the subsurface formations, is one that cannot be changed for a particular location, but where the importance warrants it is sometimes possible to move a short distance away and get a good record at a position between two positions from which bad records were previously obtained. Such good spots, due to subsurface conditions, are not predictable and only shooting will disclose them. However, often the spread position may be selected with reference to observable surface conditions instead of laying out a uniform pattern of spreads before careful inspection of the ground. This is particularly true in areas of rolling or rugged topography. Sometimes the geophones should be placed in the valley and the shot points on the higher ground, though the best system for each area should be determined experimentally, without too much reliance on previous experience.

Spread

As might be expected, almost all possible spreads have been tried at one time or another; each has its adherents, and may be particularly suitable to certain conditions. One basic subdivision can be made, between the close and the open spread. In the former the geophones are arranged close to the shot point, and it is expected that the effect of the ground roll will have subsided by the time that the reflections to be used have reached the surface. Ground roll starts at the shot point; it travels at an approximately horizontal velocity of 1000 ft. per sec. and continues long enough to obscure the record from 0.4 to 0.6 sec. after its first appearance on the record. A spread with the most distant geophone 1000 ft. from the shot point would therefore be unsatisfactory for reflections arriving earlier than 1.5 sec. subsequent to the shot time. This assumes maximum ground-roll intensity. Actually many areas have hardly any noticeable ground roll, and its manner of variation from place to place is not fully understood. An advantage of the close spread is that the reflections arriving almost vertically have less effect in producing secondary surface waves than do those with the open spread. A reflection, therefore, tends to vary in character less from end to end of the spread in the close spread. The commonest close spread is the split spread, in which the geophones are arranged along a line that passes through the shot point, and are symmetrically spaced on each side of the shot point. In reasonably good shooting territory, a space of 200 ft. between geophones (or groups that feed a single string if there are multiple geophones) is found to be satisfactory. With a 12-string recorder the spread would then be 200 to 1200 ft. on each side of the shot. In areas of more difficult shooting, it is sometimes desirable to shorten the geophone spacing to 100 ft. With fewer strings on the recorder —for instance, a six-string outfit—it is common to shoot one side at a time, using two shots from the same shot point. Sometimes one geophone is opposite the shot point but offset to the side of the line, and this geophone is retained at the same position for both shots to "tie" them together.

The practice of using multiple geophones was developed particularly for use with the close spread. Instead of a single geophone at each position, a group of two, three or more geophones are arranged in line toward the shot point. The spacing between geophones of the group is calculated to cancel out the reflection frequency (30 to 50 cycles per sec.) contained in the ground roll. Thus if a reflection frequency of 40 cycles is assumed, and a ground roll velocity of 1000 ft. per sec., the crests of this component of the ground roll will be 0.025 sec. apart, and for cancellation we will require that the ground roll ar-

The symposium on seismograph exploration started in the Second Issue, June, of the California Oil World, is concluded in these pages. Written without mathematical formulas or problems in physics, this A. I. M. M. E. presentation should be of wide interest and service. Parts 1, 2 and 3, were written by Walter A. English, Willard H. Tracy and Arthur Nomann. Readers will favor the California Oil World by voicing their opinion on the value of publishing symposia of this type.

Preparing to reel in cables and pick up geophones for another location.

rive at successive geophones of the group at time intervals of 0.0125 sec. This calls for a geophone spacing of 12.5 ft. To cancel the fundamental frequency of the ground roll would require a geophone spacing of something like 50 ft., but this low fundamental frequency is easily removed by filtering. In all conditions except extremely abrupt variations in thickness of the surface weathered zone, the reflections will arrive at almost the same time at all of the geophones of a group; that is, the pulses of the reflection will be in phase and so will be additive to the group. This theory leads naturally to the conclusion that the more geophones in a group the better, and as a matter of fact as many as 16 geophones have been used in a single group in attempting to cope with unusually difficult shooting areas. For most areas experience has shown that four to a group is the point at which the law of diminishing returns sets the limit of good practice.

Preparing to plug a shot hole.

The compound hookup may be considered as a variant of the principle of multiple geophones. In such a hookup each geophone does double or triple duty, the record written by each string being a running average of the impulses from the geophones that feed the preceding and succeeding strings as well as from the group to which the string is more directly tied. This hookup, when properly applied, is an attempt to obtain the advantage of multiple geophones, without having to resort to an unwieldy number of separate geophones. As an example, suppose a split-spread arrangement, where 16 geophones are placed on each side of the shot point, the nearest 300 ft. from the shot point and the rest arranged at 15-ft. intervals farther out, and an eight-string recorder. By taking a running average, the two center strings on each side of the shot point (numbers 2, 3, 6, 7, as ordinarily numbered) will have the benefit of multiple geophone effect of 12 geophones, and this may aid in making a correlation between the two sides of the shot point. Then if the correlation between the two sides seems reliable the distance, though short, is sufficient to be used for getting a dip that might not have been obtainable otherwise. However, such a record should be considered chiefly of advantage for correlation, and the advantage of the several-string record is that the particular reflection being sought may have its best appearance on only one of the strings, because of local surface or other geological conditions. A further extension of the compound hookup principle is where a running average is taken from end to end of a single side spread, or of a split spread with no wide gap in the center. The reliability of dips taken from such records must be less than of those achieved by more direct methods. The argument is that if such heroic methods are necessary in order to get the successive strings to "line up" in a satisfactory manner, the geology may be such that the dips are inherently unreliable.

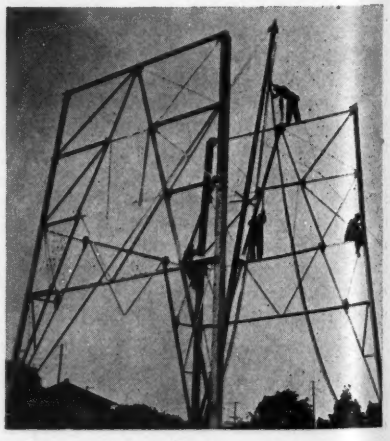
Developing a seismogram.

The open spread is commonly on one side of the shot point only, and may be at such distances as 1600 to 2400 ft., or possibly such a spread may be combined with one of 2400 to 3200 ft. All of the shallower reflections will arrive in advance of the ground roll, therefore will be completely free from any interference from that source. Under such conditions a very slightly filtered record may be used to advantage. Experience has shown that, owing to conditions that are not easily recognized, the open spread will give better records in some areas as compared to the close spread, and vice versa. It is to be noted that the character of the same reflection varies somewhat when open spreads and close spreads are compared for the same shot point.

In dip computations with the open spread, the assumed velocities are more critical than with the close spread, and in areas where it is suspected that the velocities may vary between on and off "structure" it is desirable to lay out the shooting program in such a way that the same reflecting surface is shot from both updip and downdip shot-point positions, and the dip determined as the average of the two separate results. The open spread is convenient for rapid shooting along a reconnaissance line. With a 1600 to 2400-ft. spread the shot points will be spaced 4000 ft. apart, and each geophone layout shot from two directions.

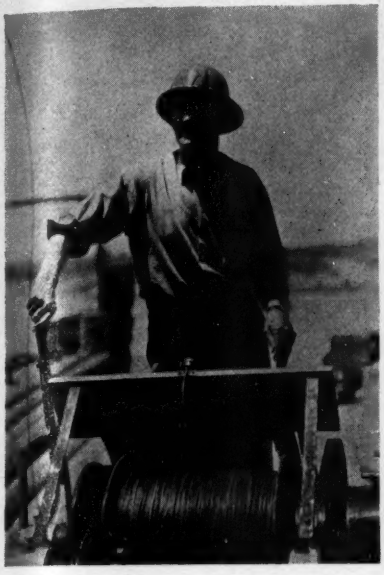
For very detailed work it is sometimes desirable to shoot open and close spreads combined. This may be achieved, for example, by spacing shot points 1200 ft. apart and shooting one side close spreads of 200 to 1000 ft. both ways toward the geophones. Then skip to the shot points farther out and shoot two 1400 to 2200-ft. spreads. In this way the maximum of information is obtained along a profile line, but it requires a minimum of four shots per hole, not counting repeat shots, and it is usually necessary to have cased holes in order that the shots may all be put off before the hole becomes unshootable to the correct depth. In areas where deep cased shot holes are necessary, such a shooting program is desirable to get the greatest amount of information possible from each shot hole.

Another variation is the T and L spreads, in which the position of the shot point is offset from the direction of the line of geophones. The advantage



Wonder how Hollywood has managed to miss the derrick builders as material for a thriller?

is that the travel paths to all of the geophones are all about of the same length, and the angle of reflection does not change much for different parts of the spread. Such a spread is particularly adapted to a continuous spacing of



It is poor economy to omit frequent surveys of the course of a drilling well. This speedy reel makes time out for the job negligible.

the geophones, as successive spreads may be tied together by a common geophone position without having to come undesirably close to the shot point. The weathering data from such a spread is also said to be more reliable than for the in-line shot point type of spread. A disadvantage is the greater difficulty of obtaining access to two lines of positions, instead of the single line that may be placed conveniently close to a road for the ordinary spread. In special conditions the circle spread is useful. In this the geophones are arranged around the circumference of a circle of which the shot point is the center. This is particularly desirable in areas of complicated geology in which dips in several directions might be expected in a single record. The reflecting surface is a disk, which may be taken of moderate dimensions, and so if more compact and less likely to include a warped or irregular surface than the more extended single line of reflecting bed. If the arrival times of a circle shot are plotted on rectangular coordinate paper, they will fall into a sine curve, of which the amplitude is a function of the amount of dip and the phase angle with reference to a fixed azimuth gives the direction of dip.

Depth of Shot

The depth of a shot hole must be correctly determined to a considerable degree of precision. In some areas a difference in shot depth of 5 to 10 ft. may make the difference between getting a good record or a poor one. The so-called layer of surface weathering is important in relation to hole depth, it being necessary to have the hole at least as deep as the top of the "unweathered" zone and usually depths of 5 to 40 ft. within the unweathered are preferable. The weathered zone is characterized by low velocities of propagation of seismic waves. At the top of the unweathered there is a comparatively sudden increase in wave velocity, below which there is a gradual increase in velocity with depth. In Tertiary beds the uppermost unweathered will have velocities of 5500 to 6500 ft. per sec. The velocity in the weathered zone increases downward from as low as 700 or 800 ft. in the top foot or two of dry material to perhaps 3000 or 4000 ft. close to the base of the

New extensions, deeper discoveries, and new fields keep the California Oil World's oil scouts busy.

weathered. The top of the unweathered can therefore be recognized by drilling a hole to considerable depth and determining the travel times to the surface from shot points spaced at, say, 10-ft. intervals from the bottom up to near the surface. It usually turns out that the top of the unweathered corresponds closely to the top of the ground water. In areas where there is a considerable annual variation in ground-water level it may be that the unweathered is limited to below the level of maximum annual depth to ground water. This suggests that the top of unweathered is really the top of water-filled strata from which air bubbles are excluded. The presence of small amounts of air bubbles in a water-flooded sand will act to greatly reduce the effective velocity of wave transmission.

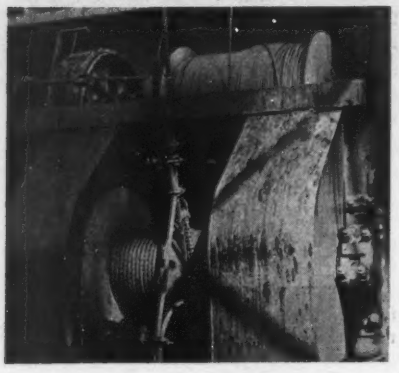
The precise depth within the unweathered at which to shoot in order to get optimum results is often a matter of experimentation for each individual hole. In general, shale beds are preferable to sand opposite the charge. Shale usually transmits the shock to the surrounding rock more efficiently than soft sand, so that a considerably smaller charge may be used in shale, and this results in less ground roll. In some places, larger charges placed opposite sand formation give the better results.

Character of Record

There appears to be a relation between type of wave emanating from the vicinity of the explosion and the frequency of the recorded reflections. To some extent the character of the shot may be judged by the sharpness of the sound of explosion. A sharp rifle-like crack from the explosion usually accompanies an efficient transmission of energy to the surrounding rock, and will give a good record of high reflection frequency (say 40 to 50 cycles). A dull, booming explosion may indicate less energy transmission and a lower frequency of reflections (30 cycles). Where it is necessary to use large charges (15 to 30 lb.) it is usually desirable to have the charge 30 to 40 ft. beneath the top of the unweathered, while small charges (5 lb. or less) usually give best results at 10 to 15 ft. below the top of the unweathered. For deeper reflections (below 2.5 sec. arrival time) larger charges and slightly greater hole depth usually give better results than smaller charges and less depth, which are satisfactory for the shallower reflections.

At least one wildcat operator visualizes this scene at Dana's Point dotted with oil tankers. The cameraman is standing near the site selected for an oil test.

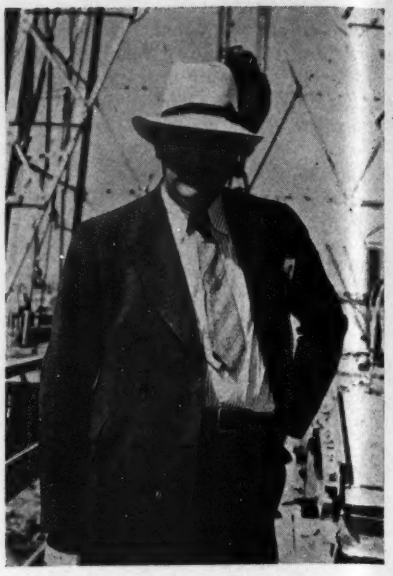
Where repeat shots are taken as a matter of routine on each spread it is usual to determine by experiment the best charge and depth. Also, if a particular spread seems to give a particular frequency of record, the filter can be changed (if multiple filters are available) with advantage so that the filtering is adapted to bring out the frequency characteristic of that particular spread. The effect of repeated shots in a hole is usually to increase the size of the zone of crushing so that larger charges become necessary to bring out the same amount of reflected energy. Record quality usually becomes worse with repeated shots but in very soft formation it sometimes happens that the effect of the shot is to compact the adjacent material and make the hole more suitable after several shots. Many companies have a program of repeat shots with varying shot depth and charge, and also amplifier filter changes, which are taken as a matter of routine at each location. With records of this type the computer must be careful to consider the instrument characteristics in comparing records, as there is usually some variation in arrival time of the same event when the instrument characteristics are varied.



There's one correct way of applying wire rope clips; U-bolts on dead end.

The character of the surface in the immediate vicinity of a geophone may have a marked effect on the record. This is particularly noticeable where part of a spread is on hard ground and the remainder on recently plowed and irrigated ground. Firm, evenly consolidated soil is preferable to loose or sandy soil or swampy areas. However, in regions of surface caliche, sand-covered areas are preferred to bare caliche, as the lesser of two evils. The immediate vicinity of irrigating ditches is to be avoided, and concrete roads may carry disturbing vibrations that will affect geophones lined up along the roadside. Trees, telegraph poles and tall grass produce a high noise level, particularly in windy weather, so that the size of the charge may have to be increased from an otherwise sufficient 2 lb. to 20 or 30 lb. in order to get the reflected energy above the level of the disturbing vibrations. The practice of burying geophones in shallow holes so that the top of the geophones may be slightly below the ground surface is partly to reduce the noise. Often better records are obtained with the geophones thus placed than when they are on the surface, irrespective of noise. With still deeper geophone burial there is a marked decrease in recorded energy and the record changes in character. Experiments with geophones on the surface and others directly below at the top of the unweathered show little similarity in appearance. In some regions the geophones farthest below the surface give the better record, but usually that is received from those nearest the surface. In swampy areas of the Gulf Coast, geophones have been attached to the tops of long stakes driven into the ground to reach a hard clay stratum.

From time to time the instruments should be tested in the field, to maintain proper adjustment. Time parallax between the different recording channels should be particularly guarded against. This may be either optical or electrical. The simplest test is to place a group of geophones side by side on hard, similar ground and test with a reflection record. All the strings should give the same record in both character and time of arrival. If they fail to meet this test the geophones should be interchanged to different record channels, to make sure that there are not slight differences in response due to their slightly different positions on the ground. If the instruments are not in perfect adjustment various further tests will suggest themselves in order to localize the trouble. The reliability of the timing system must also be tested occasionally. A non-driven fork to actuate one of the galvanometers to compare to the timing lines should be satisfactory.



Haskell Greene, owner of Gremac Oil Co., was watching completion of his Terminal Zone well in Wilmington field.

You will see these men around Long Beach Harbor Development Co.'s operations at Santa Clara Landing. Left to right: E. E. Pyles, Hancock; R. H. Green, Signal; J. E. Toussaint, Standard, and Paul Andrews, Signal.

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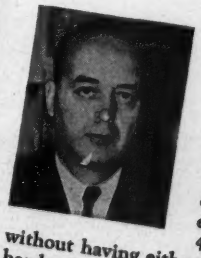

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Determination of Geologic Structures From Study of Seismograph Records

By P. C. KELLY

The processes involved in turning a set of seismograph records into a geological structure map may be divided into three classes. (1) picking reflections on the records, to be used for computations; (2) determining the basis on which the computations should be made in order to arrive at correct results; (3) making the necessary computations and plotting sections and maps.

The first is usually done by the crew chief, or at least checked by him. The computing system usually originates in the head office, occasional consultations with the party chief providing modifications as necessary to meet special conditions. The computations and plotting are done by the party computer, with possibly one or two assistants if the calculations require much time.

Picking the Reflections

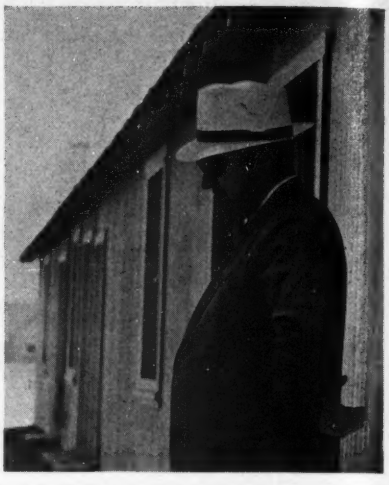
Marking of the reflection on the records is perhaps the most important step and the one most likely to determine the reliability of the final results. Making the "picks" is important because most of the problems that come up in practical work are connected with the problem of what can be done with poor records. The lack of any definite criteria by which to judge what are good and usable reflections is at the bottom of the difficulty. Give the same set of records to several people to mark and they will probably come out with a variation in the number of reflections per record that are deemed usable. With good records the correct picks are obvious to all, but with poor records experience seems to be the only reliable guide as to what picks are reliable and what are merely born of imagination and desperation. Experience in marking records and seeing how the structures eventually check out is more important than training in physics or geology. Different types of equipment and shooting methods may produce records quite different in appearance, from the same territory, and the computer can do his best work with records of a type on which he has had considerable experience, and has learned the limitations and shortcomings as well as the virtues of the data with which he is working.

Reflections may be picked for dips only, in which case the particular reflection picked is not recognizable with certainty on records from any other spread. For the purpose of computing dips it is necessary that the reflection be marked on all or nearly all of the strings of the records as the dip computation calls for determination of the depth of the reflecting bed at two points and the dip is the indicated slope between the points. The farther the observation points are apart, the stronger is the result, and the less it is affected by small geological irregularities that may not be recognized and corrected for. It is desirable, therefore, to have the picks appear on the two outside strings of the record in order to compute the dip.

If the same reflection appears on records from several spread positions, it is called a correlation reflection. If the reflection is unmistakable on the different records, the correlation method should lead to a considerably more accurate map than if the dip method only is used. If several correlations at fixed time separations can be recognized, the reliance to be placed on each is greater. Where good correlations can be picked it is unnecessary to compute any dips, but usually it is desirable to compute dips also in order to have a check on the reliability of the correlation. If in plotting a profile it is found that the correlation indicates a slope in one direction and the computed dip is in the opposite direction it is obvious that something is wrong with one or the other. Correlations have the further advantage that they will show up faulting, while dips ordinarily will not do so.

Making Computations

Devising the computing system to be used is the most interesting of the tasks connected with computing, as it opens the way to an almost unlimited amount of delving into theoretical questions of geology and physics. The physicist may research on the elastic behavior of rocks under great pressure, and the mathematician may produce equations that leave the simple engineer far behind. Perhaps



E. R. Stanley, petroleum consultant for the Long Beach Harbor department, misses nothing at Santa Clara Landing.

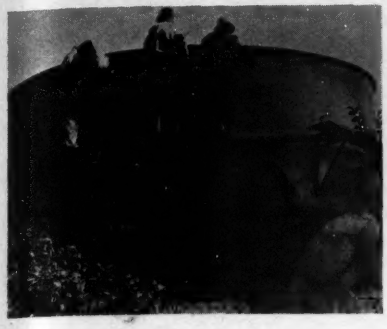
the most desirable line of research is that leading to more exact experimental data taken in the field. There are surprisingly few data on field experiments in the literature. In order to arrive at a system of computing simple enough to be practical, it is necessary to make simplifying assumptions as to wave travel in the earth. The assumptions themselves are simple and understandable, and their validity rests on checking whether they seem to lead to useful results. When these assumptions are made the computing system reduces to simple arithmetic and a few problems in solid geometry.

Our basic data are travel times of reflected waves from a common source to different observation points. We wish to turn these into travel paths of known position. The first assumption is that the waves travel in straight lines except where reflected, and that at a position of reflection the angle of incidence is equal to the angle of reflection. Actually the wave paths are slightly curved when passing obliquely through beds of varying velocity constant, but calculations show that for the changes in velocity actually encountered, and the small angles of incidence of the wave to the surfaces of change, the amount of correction required because of curved

The beach at Santa Clara Landing will not look like a Signal Hill forest.

path is so small that it may be neglected.

The next problem is the velocity of transmission of the waves through the various strata encountered. Travel times



Good welders find lots of work in the Basin these days.

must be converted into travel distances. Our most reliable source of knowledge of subsurface velocities is from deep-well shooting. By lowering a specially constructed geophone into a well, and determining travel times from shot points on the surface to the well geophone, the velocity constant (instantaneous velocity, or incremental velocity) is determined for the various strata encountered in the well. Such data show that where there is no marked change in lithologic character, the velocities increase downward at a rather uniform rate. It appears probable that a considerable part of this increase is due to loading; that is, to the effect of the pressure from the overlying beds in changing the elastic character of the buried strata. According to Hooke's law there should be no effect on velocity from the loading of a homogeneous elastic material, but according to the best data available it appears that Hooke's law is not even approximately true for sedimentary formations and for the pressures involved. For instance, limestone formations that have every appearance of being identical in character have several thousand feet per second higher velocity constant at a depth of two miles than close to the surface.

Besides the effect of loading, the increase downward in velocity must be in part due to the previous history of the beds, which must tend to make the lower beds more compact and better cemented, and consequently with higher velocity constant. It is an elementary fact of geology that heat, pressure and time are a combination leading to hard rocks; clays change to shale, and shales to slates, under such processes. The lower the position of a stratum in the stratigraphic column, the greater the amount of heat, pressure and time that have acted to consolidate the rock and increase its elastic moduli. Subsequent earth movements coupled with erosion of the surface of the ground may have acted to bring a stratum much nearer the surface than its depth of maximum burial but it should retain the greater part of the hardening effect of deep burial. Present depth therefore is not a direct function of the amount of hardening that a rock has been subjected to in its history subsequent to deposition.

In any particular case it is difficult to determine with the data available what proportion of the increase in velocity downward is due to loading and what to stratigraphic position. It seems probable that each of these factors has a normal rate of increase downward with each different type of sediment, being different for sandstones than with shales or limestones. The problem is by no means incapable of exact solution if sufficient data were available, but in the absence of such data we must select some assumption of relation of velocity to depth and geology usable for the problem at hand. It works out that the computing is much simpler if we select increase of velocity with depth and ignore stratigraphic position for the computation of at least a first approximation to the structure. To the extent that the stratigraphic component is important, this will produce a map with a slightly incorrect amount of structural relief but will give a correct qualitative picture. It has the advantage that the computation for plotting of both dips and correlation depths in originally disconnected areas will be in agreement and can be checked against each other. This assumption is satisfactory for both the Gulf Coast and the California Tertiary. On this basis it is possible to prepare a table or graph that will give velocity constant for each depth, irrespective of geographical location, and also an average velocity to each depth. It is then possible to convert travel times into travel distances and arrive at a solution for dip of the reflecting surface when travel time to two surface observation positions is given.

The assumption of increased velocity with depth does not mean that eventually the stratigraphic effect will not be considered, but only that the first approximation to the structure will be computed on the simpler assumption. Actually toward the edge of the basin the older strata will be involved, and the velocities will tend to be higher for the same depths. On the other hand, the lithologic character will also change areally and affect velocity, and these two effects can be corrected for at the time if well-shooting data are available for various parts of the region shot, or the velocities are otherwise determined. This correction can be made by preparing a depth correction sheet to be applied to the preliminary contours in much the same way that an isopachy sheet is applied to extrapolate structure contours from a horizon for which the control is good to a deeper one for which only a few determinations of the stratigraphic interval between the two are available.

It is also possible to determine subsurface velocities from the arrival times of reflections themselves. The method amounts to determining the radius of curvature of the returning wave. In order that the result may be at all accurate, it is desirable to have data on as large an arc of the wave as possible. The time elements involved in the calculation are small, and slight errors of observation or slight irregularities in surface conditions will cause considerable errors in the computed result. However, if a large number of solutions are made and properly averaged, velocities should be accurate to possibly 2 per cent error. This method is of necessity used in areas where no well-shooting data are available, and it may be used to

Goff "Island," midway between Los Angeles and San Diego, causes excitement every now and then when an amateur geologist discovers "oil outcroppings". Source of the oil, however, is the sea washing the lee side.

extend information to depths greater than those penetrated by any well. It is also used on the Gulf Coast, where the velocities over the crests of salt domes seem to vary considerably from the normal off-structure velocities.

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Another assumption necessary for dip computation is that for each spread the source of a reflection is a bed, which acts as a smooth, unwarped surface in producing the reflection. Actually the energy return considered as a single reflection on the seismogram may be a summation of several reflections from adjacent strata. The several amplitudes and phase relationships of the separate reflections will determine the character of the summation. This summation feature renders the computed dip particularly sensitive to variations of reflecting power of any one of the contributing beds. The change in reflecting power of a stratum may be due to changes in its elastic characteristics with change in lithologic type or amount of cementation, or to change in thickness. To illustrate such false dip effects with an example, suppose that there are two similar reflecting beds, each 10 ft. thick and separated from each other by an interval of 25 ft., which contribute to a combined reflection. Now suppose that the upper bed decreases in reflecting power 50 per cent between the positions where the reflection to the top string and the bottom string of an 800-ft. spread takes place. This will compute out to give approximately one degree of false dip. The amount of variation postulated in this example is moderate when compared with what seems geologically probable for many of the formations of the shallow marine type that are prospected for oil. Under such conditions, any one dip is not to be considered accurate, and an average of many such dips must be taken to arrive at trustworthy results. Cross bedding is another feature that may lead to lack of parallelism between computed dips and the actual true

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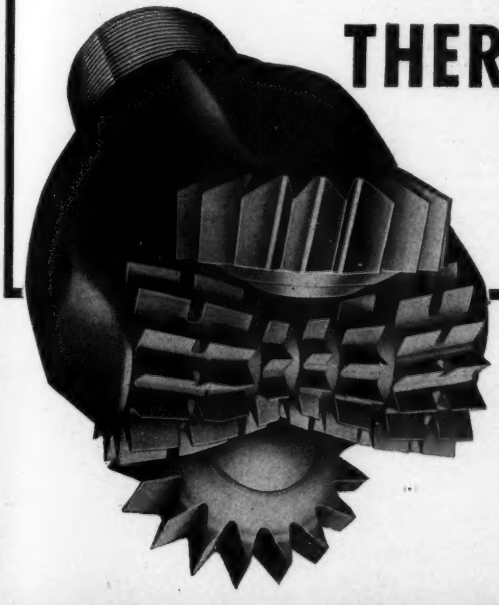
stratification. The geologist is able to recognize cross bedding in surface outcrops, but the seismograph is unable to make any such distinction.

When a reflection is correlated over a considerable area, there may be more gradual changes in lithology, which affect the parallelism between the computed position of the source of the reflection and the actual bedding of the formation. Suppose the source of a reflection is a series of thin, hard beds in a shale formation. As one follows the formation laterally new hard stringers may appear, their top gradually ascending in the formation. Under such conditions one would expect the reflection to change slightly in character from place to place, and such a reflection should be used with caution. The possibility of "skipping a cycle" familiar to all computers is an accompaniment of changes of this type. The same energy band may be correlated from record to record with certainty but the individual cycles at the start of the reflection seem to fade out or increase in energy from place to place. Such errors should be avoided in continuous shooting traverses, but with considerable jumps between shot locations two different records may show prominent reflections of nearly identical appearance and at the same general arrival time, yet one will actually begin a cycle in advance of the other.

Before dips or depths can be accurately computed travel times of reflections must be corrected for variations in velocity constant and thickness of the beds immediately below the surface of the ground. These corrections are known as weathering corrections. In many areas they are of a magnitude comparable to the time differences that determine the amount of the computed dip. Most of the data for making weathering corrections come from the arrival times of the fastest wave, which is the first wave to reach each of the geophone positions. Every few miles the velocity characteristics of the weathered zone should be determined in detail by shooting at 10-ft. intervals from top to bottom of a shot hole and determining vertical travel times to the surface of the ground. It must be assumed that elsewhere the weathered zone has the same relation between thickness and travel time as at these holes for which it is definitely determined. The details of computing the weathering correction vary somewhat with each party or system, but in no case are they complicated either in theory or in the type of calculation required. Unconsidered irregularities are usually present in the weathered zone in sufficient amount so that the correction does not give perfect results.

In areas where there are thin streaks of high-velocity material in the weathered zone, the data from the fastest wave is unreliable, and there is no solution for the weathering correction except measuring it by uphole time at the shot point and assuming that the same travel time applies to the nearest geophones, which should not be far away. In such areas, of which West Texas is an example, neither dip computations nor open spreads can be used to advantage. In still other areas geological conditions may cause a two-layer correction; as, for example, where there is an irregular thickness of gravels or other similar formation beneath the weathered zone, which may extend to a depth of several hundred feet and have an intermediate velocity constant between that of the weathered zone and that of the more regular underlying formation. More elaborate weathering data are required, and because of differences in velocity each of the two irregular surface layers must be separately corrected for.

(Continued on Page 16)



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PRODUCTION :-: DEVELOPMENT

(Figures of Production and Stocks are in barrels of 42 Gals.)

	Total Production May	—DAILY AVERAGE— May, 1939	April, 1939	May, 1938
Group No. 1				
Arvin	20,857	673	456	.....
Belridge—North	363,032	11,711	11,554	12,264
Belridge—South	34,564	1,115	1,112	1,040
Canal	143,185	4,619	4,261	1,830
Canfield Ranch	586	19	35	126
Coalinga	370,004	11,936	11,142	10,024
Cole's Levee	12,601	406	292	.....
Edison	74,072	2,389	2,306	2,891
Elk Hills	305,724	9,862	9,892	10,811
Fruitvale	203,025	6,549	6,776	9,254
Greeley	61,197	1,974	1,621	3,473
Kern River	326,433	10,530	11,149	12,766
Kettleman Middle Dome	974	31	34	54
Kettleman North Dome	1,647,345	53,140	53,057	71,566
Lost Hills	96,808	3,123	3,305	3,656
McKittrick	113,399	3,658	2,940	3,300
Midway-Sunset	1,646,753	53,121	52,956	63,322
Mountain View	252,977	8,161	8,428	12,085
Mount Poso	380,892	12,287	13,123	19,240
Rio Bravo	238,842	7,705	8,398	3,250
Round Mountain	329,847	10,640	10,930	15,738
Ten Section	276,778	8,928	8,652	5,948
Tupman	15,517	501	519	.....
Wasco	37,953	1,224	719	666
Wheeler Ridge	10,160	328	321	308
Group No. 2				
Capitan	75,219	2,426	2,484	2,857
Elwood	131,997	4,258	4,257	6,757
Rincon	109,130	3,520	2,915	4,471
San Miguelito	78,285	2,525	2,413	2,768
Santa Barbara	9,290	300	280	454
Santa Maria	499,595	16,116	18,577	13,997
Summerland	1,289	42	31	35
Ventura Avenue	1,088,602	35,116	33,194	36,224
Ventura-Newhall	178,463	5,757	5,940	4,983
Watsonville	930	30	30	40
Group No. 3				
Brea-Olinda	169,429	5,465	5,565	5,722
Coyote—East	69,201	2,232	2,241	3,552
Coyote—West	232,829	7,511	7,712	8,894
Domingues	665,158	21,457	21,148	27,102
El Segundo	102,090	3,293	3,302	11,026
Huntington Beach	921,922	29,739	29,167	33,154
Inglewood	365,520	11,791	11,697	14,840
Lawndale	1,897	61	67	93
Long Beach	1,497,634	48,311	48,559	58,067
Los Angeles-Salt Lake	15,692	506	493	524
Montebello	542,412	17,497	15,496	10,676
Playa Del Rey	153,113	4,939	5,201	6,711
Potrero	32,941	1,063	954	453
Richfield	266,712	8,604	8,552	9,106
Rosecrans	397,338	12,817	13,533	6,810
Santa Fe Springs	850,160	27,425	27,791	36,246
Seal Beach	227,478	7,338	7,356	8,813
Torrance	608,155	19,618	21,721	11,746
Whittier	31,487	1,016	970	929
Wilmington	2,786,479	89,886	87,838	97,949
Total	19,073,972	615,289	613,462	688,611
April	18,403,853	613,462		
Increase	670,119	1,827		

	New Rigs Up	Active Drilling	Producers Completed	Daily Initial Output	Active Producing	Abandoned Wells Drillers	Abandoned Wells Producers
Group No. 1							
Arvin	5	2	2	5,432	4	....	....
Belridge—North	..	4	1	424	66	....	....
Belridge—South	..	....	....	....	86	....	....
Canal	..	2	1	1,875	22	....	....
Canfield Ranch	..	....	....	....	1	....	....
Coalinga	10	12	6	20,814	819	3	1
Cole's Levee	..	4	1	260	3	....	....
Edison	..	....	....	....	88	....	....
Elk Hills	..	1	....	....	168	....	1
Fruitvale	..	2	1	109	173	....	....
Greeley	..	4	3	13,804	17	....	....
Kern River	2	4	1	5	1,290	2	....
Kettleman Middle Dome	..	....	....	....	3	....	....
Kettleman North Dome	3	13	3	9,930	227	....	....
Lost Hills	..	....	....	....	245	....	....
McKittrick	..	1	....	....	191	....	....
Midway-Sunset	1	4	1	35	2,529	....	3
Mountain View	..	....	....	....	177	....	....
Mount Poso	1	1	2	525	280	2	1
Rio Bravo	4	3	1	3,027	29	....	....
Round Mountain	..	1	1	25	205	....	....
Ten Section	1	1	....	....	31	....	....
Tupman	..	1	....	....	2	....	....
Wasco	..	1	1	7,500	6	....	....
Wheeler Ridge	..	....	....	....	33	....	....
Group No. 2							
Capitan	..	....	....	....	45	....	....
Elwood	..	....	....	....	81	....	....
Rincon	1	1	....	....	54	....	....
San Miguelito	..	2	....	....	20	....	....
Santa Barbara	..	....	....	....	25	....	2
Santa Maria	1	3	....	....	299	....	....
Summerland	..	1	....	....	19	....	....
Ventura Avenue	3	9	2	4,325	253	....	....
Ventura-Newhall	..	10	2	400	550	....	....
Watsonville	..	....	....	....	7	....	....
Group No. 3							
Brea-Olinda	..	....	....	....	354	....	1
Coyote—East	..	....	1	300	78	....	....
Coyote—West	1	1	1	228	47	....	....
Domingues	..	1	3	1,491	187	1	....
El Segundo	..	....	....	....	50	....	....
Huntington Beach	1	3	2	480	543	....	6
Inglewood	..	....	....	....	209	....	....
Lawndale	..	....	....	....	6	1	1
Long Beach	1	1	....	....	1,228	....	2
Los Angeles-Salt Lake	..	....	....	....	112	....	....
Montebello	13	14	3	2,534	233	....	1
Playa Del Rey	..	1	....	....	178	....	....
Potrero	..	....	....	....	15	....	....
Richfield	1	....	....	....	297	....	1
Rosecrans	2	6	2	457	130	....	....
Santa Fe Springs	..	....	....	....	574	....	2
Seal Beach	..	....	....	....	101	1	....
Torrance	1	4	4	592	720	....	....
Whittier	..	....	....	....	143	....	....
Wilmington	13	19	15	7,872	641	....	....
Miscellaneous Drilling	4	28	....	....	....	9	....
Group No. 4—Gas Fields							
Buena Vista Lake	..	....	....	....	1	....	....
Buttonwillow	..	....	....	....	....	....	....
Chowchilla	..	....	....	....	....	....	....
Delano	1	1	....	....	4	....	....
Dudley Ridge	..	....	....	....	....	....	....
Goleta	..	1	....	....	....	....	....
Marysville Buttes	..	1	....	....	2	....	....
McDonald Island	..	....	....	....	4	....	....
Rio Vista	..	....	....	....	23	....	....
Semi-Tropic	..	....	....	....	....	....	1
Tracy	..	....	....	....	....	....	....
May	70	168	60	82,444	13,928	19	23
April	91	177	78	71,963	13,897	45	22
Decrease (*Increase)	21	9	18	10,481*	31*	26	1*

SUMMARY OF CALIFORNIA OILFIELD OPERATIONS FOR MAY, 1939—STOCKS HELD IN PACIFIC COAST TERRITORY BY CALIFORNIA OIL COMPANIES

	May 31, 1939	April 30, 1939	May Changes	Dec. 31, 1938 (Reclassified)
1. Gasoline-Bearing Crude	39,830,694	39,530,900	+ 299,794	36,225,312
2. Non-Gasoline-Bearing Crude	14,442,707	15,195,794	− 753,087	16,282,177
3. Unblended Nat. Gaso.	2,423,266	2,201,339	+ 221,927	2,699,455
4. Gasoline (not including distributing and service stations)	15,044,669	15,400,469	− 355,800	13,259,369
5. Naphtha Distillates	1,339,712[1]	1,407,569[1]	− 67,857	1,566,349[1]
6. Gas Oil and Diesel Oil	10,244,405	10,826,518	− 582,113	10,539,937
7. Fuel Oil Residuum	71,091,951	70,877,903	+ 214,048	70,957,881
8. All Other Stocks	6,933,820[2]	6,656,202[2]	+ 277,618	6,153,809[2]
TOTAL	161,351,224	162,096,694	− 745,470	157,684,289
[1]Estimated amount of unfinished gasoline contained in item 5	1,159,101	1,210,404		1,350,379
[2]Coke included in item 8	253,93	222,379		92,066

Economical Derrick Floor Safety Covering

on Signal Hill Deep Test

In an effort to overcome general oil industry experience which shows that even though injuries to workers on drilling rigs are decreasing, injuries as the result of slipping and falling are increasing, the South Basin Oil Co., member of California Petroleum Safety Board, has covered the floor of its new rig at Signal Hill with a non-skid material.

On this particular rig five rolls of 90-lb. flint-covered green roofing paper were nailed to the derrick floor. In addition to its low first cost this material can be applied easily at a very low labor cost. It can also be easily replaced either in whole or in part as it becomes worn, since it is attached with common roofing nails.

The necessity for added protection for workers against injuries caused by slipping has been brought to the fore during recent years. Faster drilling equipment which requires greater skill and agility of workers, deeper wells with the necessity for time-saving in making round trips, the use of certain types of weight material in rotary mud which noticeably increases its lubricity and thereby increases the slipperiness of the floor have all contributed to the increased frequency of injuries caused by slips and falls.

These injuries have varied from slight muscle strains caused by slipping because of insecure footing while lifting heavy objects or pulling rotary slips, to crushed toes and feet caused by slipping while pipe is being racked.

Slips which have resulted in injury have frequently occurred while a crew member was guiding the load on the catline and while he was dodging falling objects. Slipping has been so frequent that of all injuries to crew members in drilling operations almost 20% are caused by it.

The problem has been given considerable study by safety-minded operators and by safety engineers. A number of methods have heretofore been used and discarded because they were either ineffective or highly and unnecessarily expensive. The method described and pictured here has proven to be not only inexpensive but effective. Not only has it prevented injuries from slips and falls but it has also added to the general efficiency of the crew, and the crew's added efficiency has in turn tended to lessen hazards and injuries not necessarily associated with slipping.

For example, because the crew members are no longer faced with worry about slipping they can concentrate on the job in hand, hence work output is noticeably increased. Furthermore, the neat and attractive appearance of the roofing paper floor has led to much better housekeeping by the crew, which in turn lowers accident hazards.

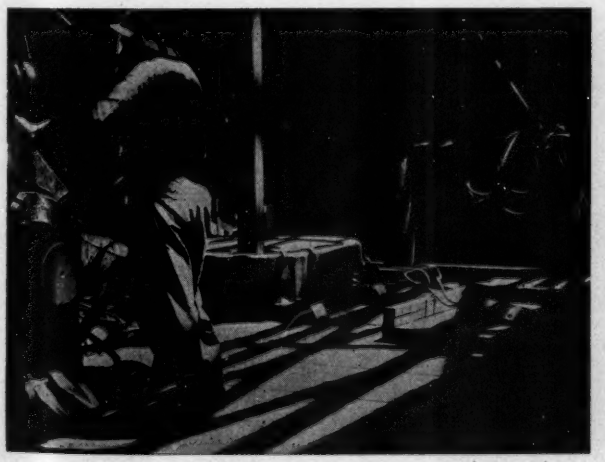
The present practice of raising derrick floors to a level considerably above that of the ground, which necessitates the use of stairways and ramps, adds considerably to slipping hazards. These hazards, as well as the ordinary hazards present on the tread of steps and stairs, the engine room floor, the pipe rack, walkways and ramps to the mud pit, and the floor around the pumps, will probably be eliminated by similar non-skid surfacing in future installations.

Freedom from slipping worries and neatness of appearance are but two of the many indirect benefits from this installation. An intangible but very important benefit is the definite improvement in employer-employe relations when the employe is given such evidence that the employer is sincerely interested in his welfare.

Here's a bird's-eye-view of action on the safety covered derrick floor.

Industry Lowers Accident Record

Declines of 13 per cent in the frequency of injuries and of four per cent in the severity of injuries gave the American petroleum industry an injury "index" of 28.54 for 1938, the lowest on record.



Above is South Basin Oil Co.'s try for the Signal Hill deep zone discovered by Soto No. 1. Note the "safety covered" derrick floor. At right, the crew need not worry about falls and injuries caused by slipping.

Foreign Club Organized By Oil Equipment Men

Realizing that a community interest exists between men who have traveled in foreign fields in the interest of oil

E. L. Decker

equipment manufacturers, a group of such men got together in California several months ago and started an association to provide and continue social contacts between them. By means of biweekly luncheons, details of organization were threshed out, by-laws formulated and the name "Nomads" selected. Believing that the association should be national in scope and that oil equipment representatives located in other sections of the country might wish to join in the movement, the group decided to make their organization a Los Angeles Chapter and invite others to form similar chapters in their localities. Such chapters are being formed in Houston and Tulsa.

Earl W. Rees

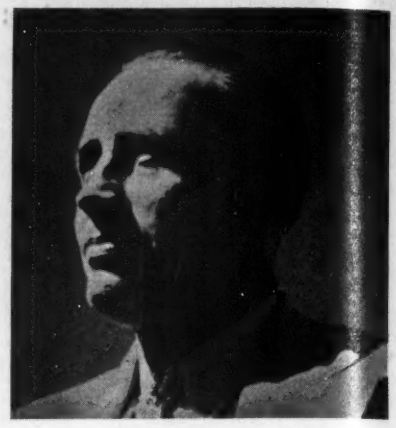
The name "Nomads" is taken from the initial letter of full name of the association which is National Oil equipment Manufacturers and Delegates Society.

F. C. Ripley

W. F. Bettis

Its objects are strictly social, fraternal and educational and its regular meetings will consist of monthly dinners at which the members can renew acquaintance and be entertained by program arranged by the entertainment committee.

Active membership in the Nomads is limited to men who have actually visited foreign countries in the interest of oil equipment manufacturers. Associate members are men who devote a substantial portion of their time to oil equipment export business. From time to time honorary members will be elected from men who have attained outstanding

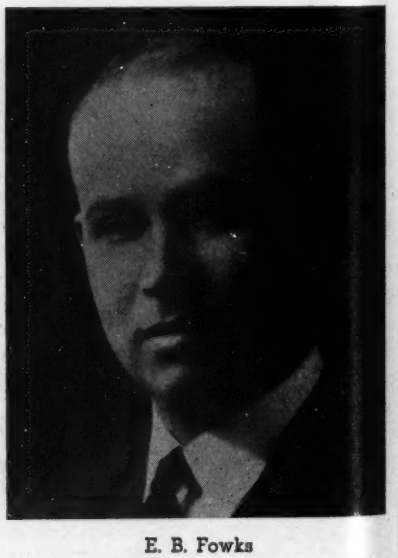


Henry Pullman

positions while in foreign service for oil companies.

Officers duly elected by the Los Angeles Chapter upon completion of the organization were: E. L. Decker, Martin-Decker Corp., president; F. C. Ripley, Emsco Derrick & Equipment Co.; vice-president; W. F. Bettis, M. O. Johnston Oil Field Service Corp., secretary-treasurer; Earl Rees, Fluid Packed Pump Co., asst. secretary-treasurer; Henry Pullman, Baker Oil Tools, Inc., sergeant-at-arms; and E. B. Fowks, Emsco Derrick & Equipment Co., asst. sergeant-at-arms.

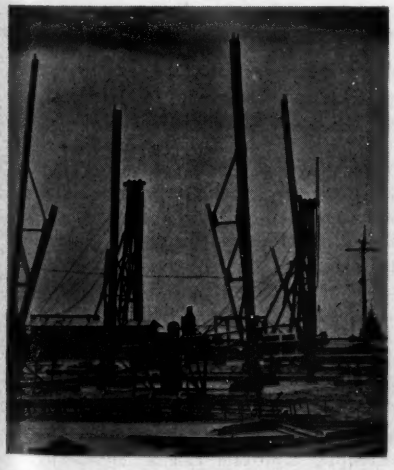
The present membership of the Nomads in Los Angeles consists of: George Anderson, Baker Oil Tools, Inc.; J. C. Axelson, Axelson Mfg. Co.; Carlton Baker Jr., Baker Oil Tools, Inc.; Jack Ballagh, Patterson-Ballagh Co.; W. F. Bettis, M. O. Johnston Oil Field Serv-



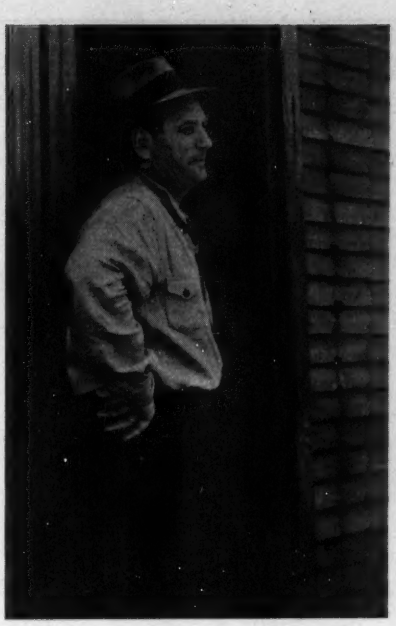
E. B. Fowks

ice; S. R. Bowen, S. R. Bowen & Co.; B. Bronzan, Baash-Ross Tool Co.; Frank Champion, Byron-Jackson Co.; Larry Coker, National Supply Co.; E. L. Decker, Martin-Decker Corp., Norman Dorn, Lane-Wells Co.; Calvin Drake, Hydril Co.; Joe Dunn, National Supply Co.; John Eastman, Eastman Oil Well Supply Corp.; R. J. Eiche, Lorraine Corp.; J. E. "Brick" Elliott, Elliott Core Drilling Co.; E. B. Fowks, Emsco Derrick & Equipment Co.; John Grant, Grant Oil Tool Co.; Abe Haglund, Axelson Mfg. Co.; L. T. Hamer, Hamer Oil Tool Co.; Clarence Hill, Oil Well Supply Co.; Ray Humphries, Axelson Mfg. Co.; Clay Johnson, Shaffer Tool Works; Blaine Johnston, Jr., M. O. Johnston Oil Field Service; A. D. Love, Chiksan Oil Tool Co ; Tom Martin, Lorraine Corp.; W. R. "Frosty" Martin, Martin-Decker Corp.; Roy McCollum, Parkersburg Rig & Reel Co.; C. J. McLaren, Hughes Tool Co.; Floyd Merritt, Elliott Core Drilling Co.; Harry Morehouse, Wagner-Morehouse; Tom Murphy, Martin-Decker Corp.; L. J. Paddock, Stoody Co.; Henry Pullman, Baker Oil Tools, Inc.; Geo Ratcliff, Baroid Sales; L. A. Rawson, Stoddard-Rawson, Inc.; Earl Rees, Fluid Packed Pump Co.; F. C. Ripley, Emsco Derrick & Equipment Co.; S. R. Robinson, Yowell Service Co.; Hans Ross, Baash-Ross Tool Co.; Wallace Sawdon, Petroleum Engineer; Walter Seymour, Non-Corrosive Products Co.; E. R. Smith, Lane-Wells Co.; Roland Smith, Byron-Jackson Co.; Ted Sutter, Baker Oil Tools, Inc.; Joe Swaton, Kerotest Mfg. Co.; Harry Therolf, Eason & Therolf Tool Co.; Ed Thompson, Security Engineering Corp., Inc.; Clarence White, Oil Well Manufacturing Corp.; Jack Wilcox, S. R. Bowen & Co.

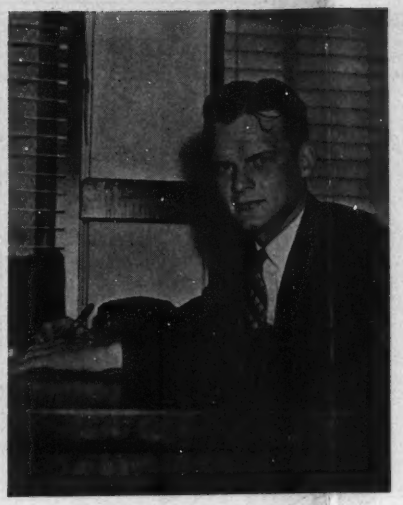
You are reading the Pacific Coast oil men's home paper.



The first of a new line of steel derricks moving closer to the sea in the Long Beach Oil Development Co. operation.

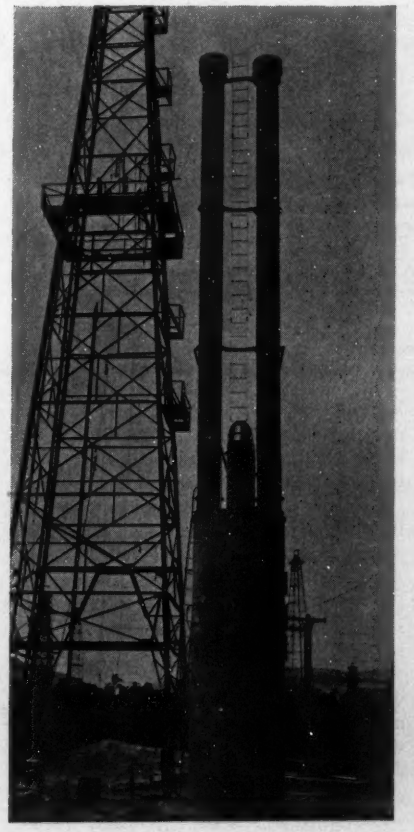


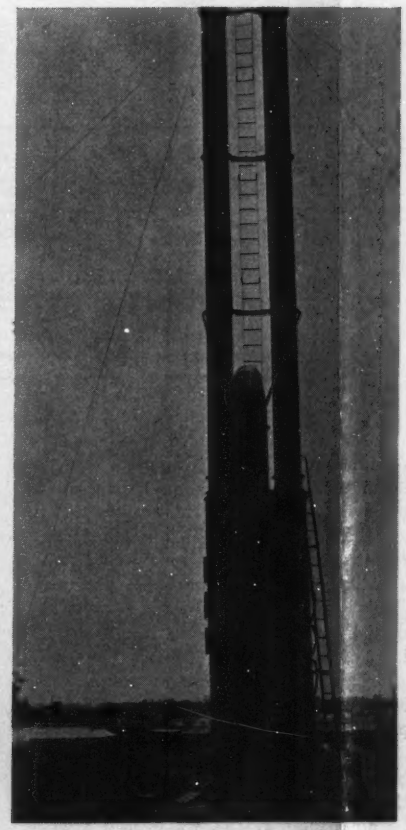
Gus Pongratz, head of several thriving oil companies and owner of some half dozen good oil wells, has made a place for himself in the Basin oil picture. "Gus," as he is widely known, was right with his men on the derrick floor when his latest West Montebello producer blew out and caused many anxious hours before it could be brought under control.



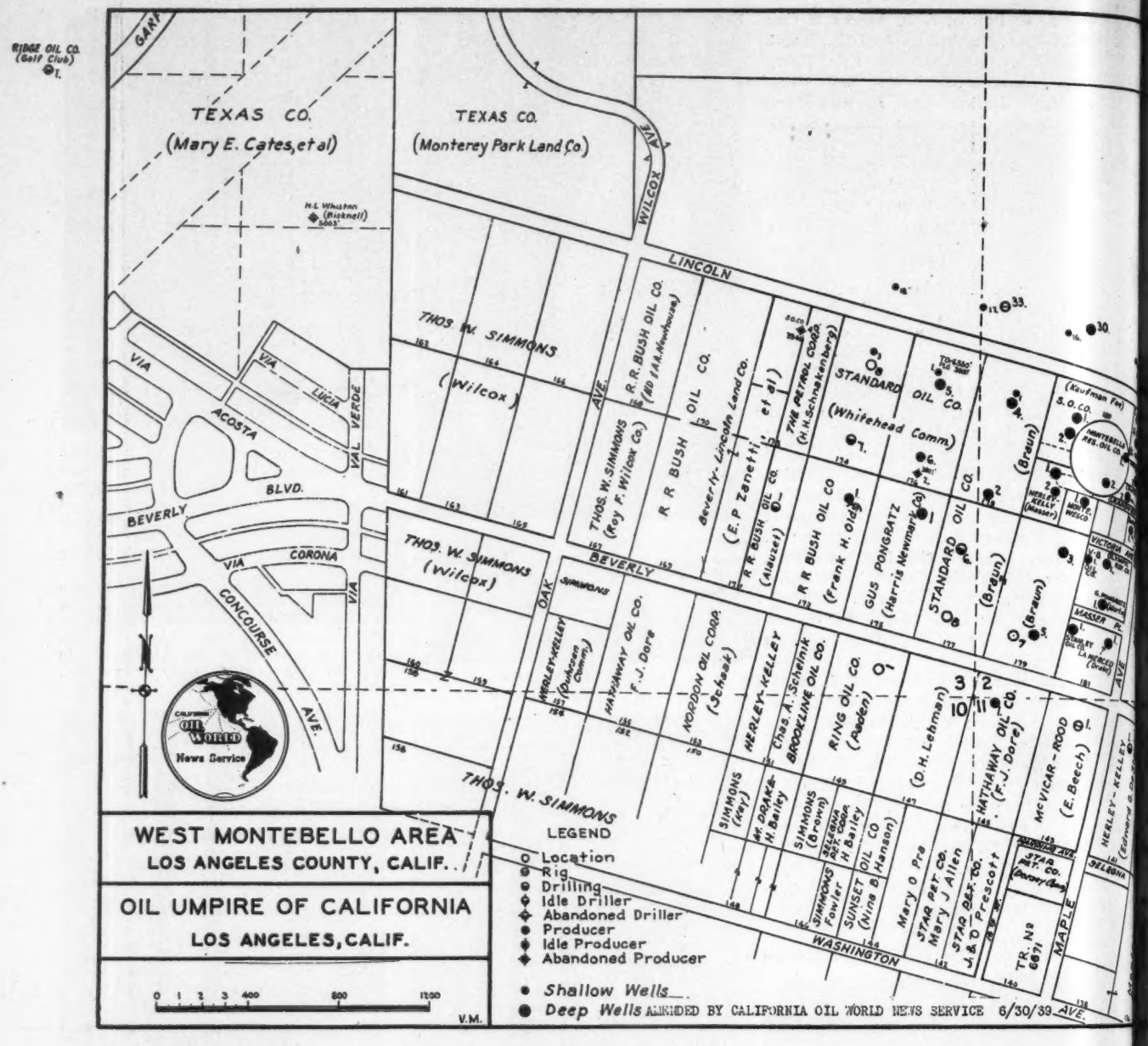
Among the up-and-coming young petroleum engineers is Morton N. D'Evelyn, who was recently transferred from Hogan Petroleum Co.'s Bakersfield division to a more responsible position in the home offices in Los Angeles.

Mr. D'Evelyn received his Bachelor's at Stanford University in 1937, majoring in geology. He was active in the laboratory and field for Hogan Petroleum Co. in the Bakersfield division from the beginning of 1938. Currently the range of Mr. D'Evelyn's activities covers the Los Angeles Basin and the Coastal fields, and, occasionally, the Valley.





Superior Tank & Construction goes out to the field to solve difficult problems. Here's a revolutionary experimental oil-gas separator in West Montebello oil field.

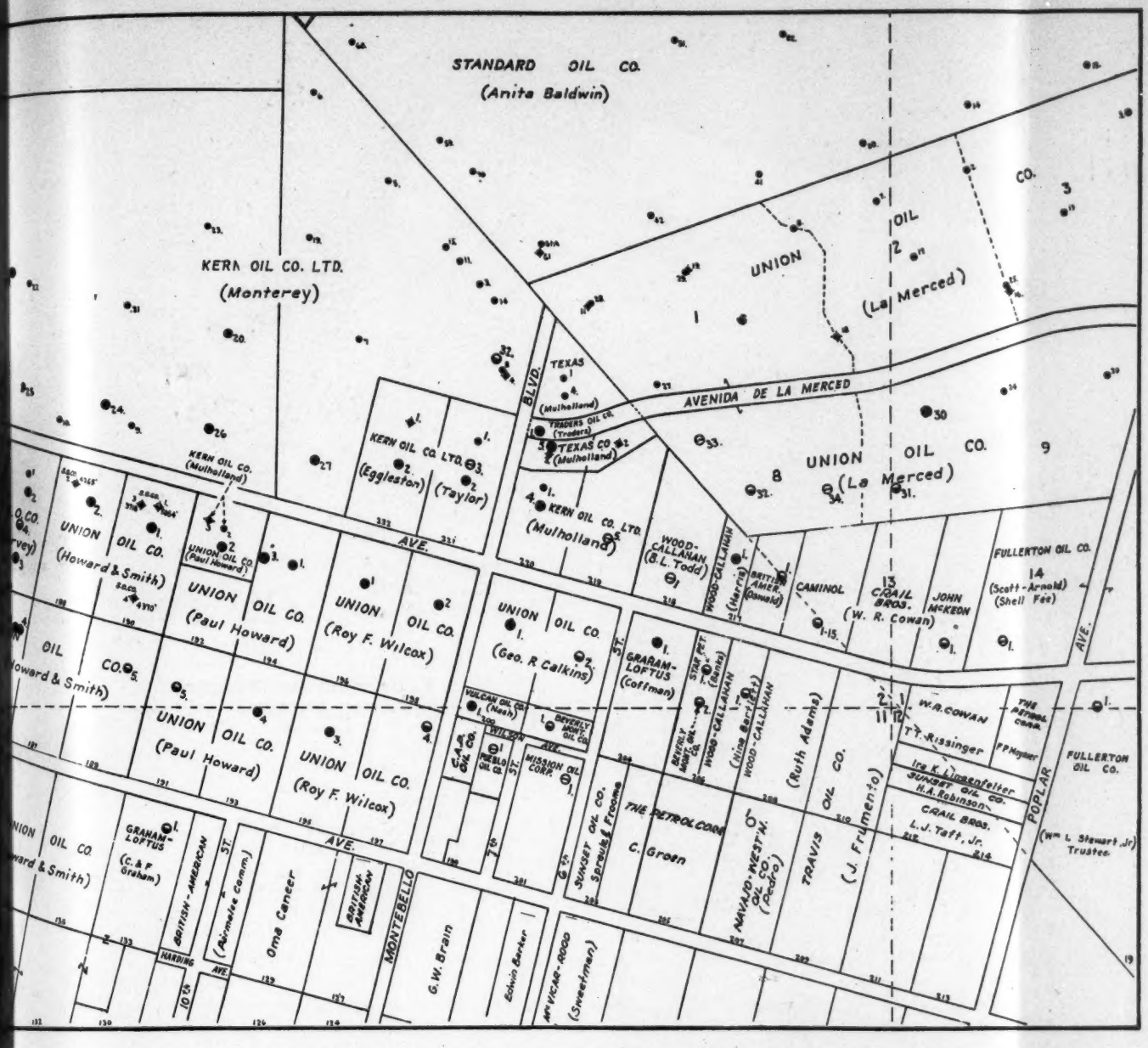


(Continued from Page 11)

In areas where still deeper stratigraphic irregularities occur, any correction becomes difficult. It should therefore be borne in mind that structural data from any horizon above which are beds subject to irregular variations in character are likely to be unreliable. The more gradual and uniform lateral variations may be determined from the geological logs of wildcat wells combined with an approximate knowledge of the velocity constants of the various types of deposits indicated on the well logs.

Further assumptions, which appear to be borne out experimentally, are that the velocity of wave travel is independent of amplitude of the wave, and also of frequency. There is some reason to believe that theoretically wave velocity might vary slightly with amplitude, but such variation if it exists appears to be too small to be of practical importance.

Before making a structure contour map it is usual to plot traverses in structure sections, showing the observed dips and correlations. This presumes that all of the reflecting points of the traverse lie in the same plane. Actually, for any straight-line spread any plane tangent to the side of a cone of revolution of which the line of geophones is the axis and the line on the reflecting bed from which the reflections came is the generating line will satisfy the requirements of the observed travel times to the various recording strings. In other words, the straight-line traverse determines only dip components, and the reflecting bed will lie directly under the line of geophones only when shooting is directly across the strike of the beds. From the single traverse we do not know whether we are dealing with the actual dip or with a dip component from one side or the other of the surface position of the traverse. If the traverse happens to cross a fold obliquely, the reflecting beds will lie first on one side and then on the other side of the position of the line of traverse. Under such conditions difficulties may arise from plotting all of the data of a traverse as though they all came from a single plane. As an example, a profile run at right angles to the axis across a syncline may show dips in two different directions coming



from the two flanks of the syncline on the same record. If these dips are plotted on the structure section each will be on its correct side of the syncline and a true picture will be shown. Now suppose that a profile is run down the axis of the syncline. The same two reflections will show up on a single record and will be plotted on the structure section as though they were both in the same plane, though actually they are separated in space by a considerable distance and have no direct structural relationship to each other. If the dips happen to be in agreement, nothing will be suspected, but if they happen to fall over other plotted dips in the opposite direction it may not be realized that all that is wrong is the attempt to plot three-dimensional data on a two-dimensional structure section.

Where the survey includes a network of interesting profiles, it is geometrically simple to determine the correct position of the surface trace of each bed at the intersection of two profiles. This gives a basis for offsetting the profile lines on the structure map, so that the reflecting beds are shown at their correct position. Such offsets are considerable for deep horizons, and any attempt to show the position of small, deeply buried structural features accurately must consider this factor.

On conclusion of each shooting job it is well to check over the results to determine whether anything that appears to contradict the original assumptions of relation of geology to wave travel has developed. If the final picture does not appear to be geologically probable the geologist will suspect that some mistake has been made even though he cannot put his finger on the spot. There has been considerable controversy between geologists and physicists as to the propriety of thus requiring the final picture to fit into the geologists' preconceived ideas as to what ought to be found. The idea of the physicist seems to be that if the problem is properly analyzed there should be nothing wrong with the premises. If the observation and computing are properly done, it then follows that the final picture must be right, however much the geologist may object to it.

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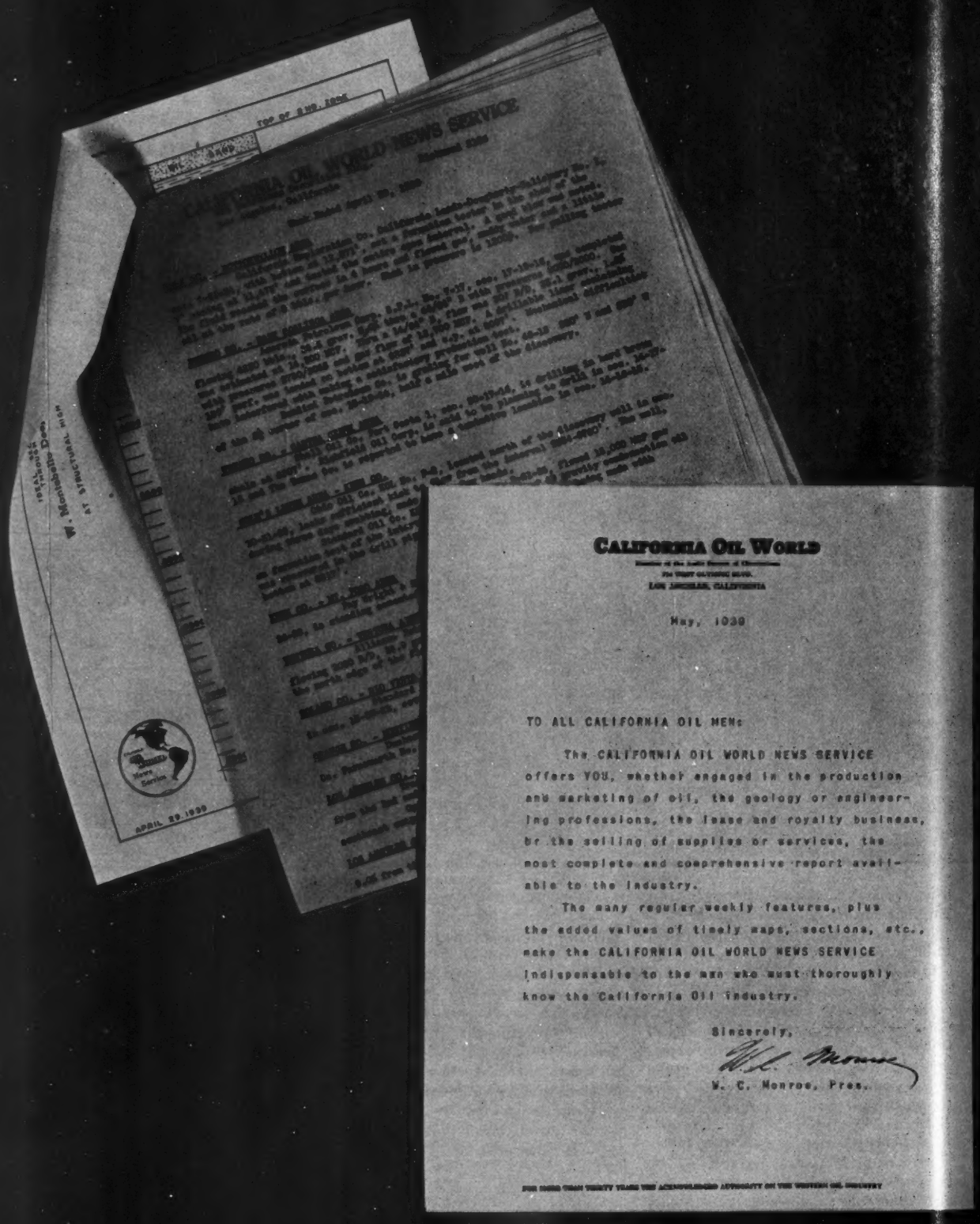


CALIFORNIA OIL WORLD

[illegible] 7TH WEST OLYMPIC BLVD.
LOS ANGELES, CALIFORNIA

May, 1939

TO ALL CALIFORNIA OIL MEN:

The CALIFORNIA OIL WORLD NEWS SERVICE offers YOU, whether engaged in the production and marketing of oil, the geology or engineering professions, the lease and royalty business, or the selling of supplies or services, the most complete and comprehensive report available to the industry.

The many regular weekly features, plus the added values of timely maps, sections, etc., make the CALIFORNIA OIL WORLD NEWS SERVICE indispensable to the man who must thoroughly know the California Oil industry.

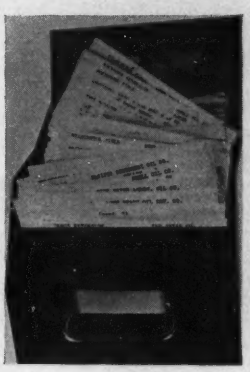
Sincerely,

W. C. Monroe

W. C. Monroe, Pres.

FOR MORE THAN TWENTY YEARS THE ACKNOWLEDGED AUTHORITY ON THE WESTERN OIL INDUSTRY

AND NOW! CALIFORNIA OIL WORLD NEWS SERVICE PRESENTS



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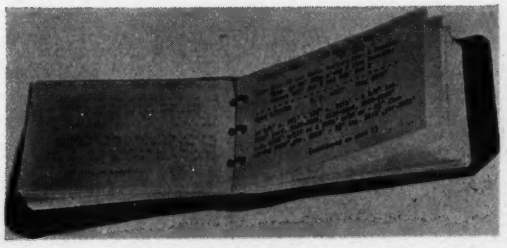
Individual record sheets, suitable for filing, either in card catalogue or in loose leaf binder, are mailed each week as completed and abandoned wells are dropped from the California Oil World News Service.

Added to the many up-to-the-minute maps and other timely material here-to-fore included with the News Service, the new record system rounds out, at no increased cost, the extraordinarily complete coverage now given our subscribers.

The California Oil World News Service itself remains unchanged as the most complete and accurate weekly resume' of active wells in California.



L. P. St. Clair Is Honored By California Oil Men

Friends, business associates, and competitors sat down to dinner at the California Club, Los Angeles, June 27 to honor L. P. St. Clair, past president and

L. P. St. Clair

retiring chairman of the board of directors of the Union Oil Co. of California. Hosts were members of the Wildcat Committee of the California Oil and Gas Association. Guests were Mr. St. Clair's fellow members of the board of directors of the Association.

J. R. Pemberton, chairman of the Wildcat Committee, who acted as toastmaster, and others eulogized Mr. St. Clair and wished him well in his retirement. His long service with the Union Oil Co., his part in the organization and operation of the Independent Oil Producers' Agency of California, his other business connections, and his many contributions to civic and charitable enterprises were all recalled. Finally, as a token of respect and friendship, Frank A. Morgan, past chairman of the Wildcats, presented Mr. St. Clair with a silver cigarette box, engraved with the signatures of all those present.

Souvenirs of the occasion were the printed menus, done up in the form of booklets containing essential information and the reproduction of an oil portrait of the guest of honor.

(Continued from Page 17)

Our only comment is that there seems to be plenty of room for either viewpoint to be wrong in any individual case. The geologist cannot be certain of what ought to be found or it would have been unnecessary to make the survey, and the physicist is unable to put on a diving helmet and follow a vibration down a couple of miles into the earth and back again and report on what happened as a matter of precise knowledge.

"Dan" Daniels' Death Closes Long Career

Another of oil industry's old timers has passed on with the death on June 26 of "Dan" Daniels at his home in Santa Monica, California. Daniels, or "Danny" as he was known to his many friends in the oil industry, died, after a five months illness, at the age of 75 years.

Daniel Daniels

He was born at Middlesborough, England, Dec. 15, 1864. At the age of 12 he came to the United States and became apprenticed as an iron worker at the Baldwin Locomotive Works, in Lima, Ohio. In 1898, Mr. Daniels came to California as head of the Bakersfield Iron Works. In 1901 he organized what was to become the D. & B. Pump and Supply Co. Under his direction the business grew rapidly from a shop 12 ft. by 20 ft., with two employes on its payroll to a concern with plants in Los Angeles and Dallas, Texas, with over 500 men in its employ at the time the company was sold to the Emsco Derrick and Equipment Co. in 1927.

Daniels made notable contributions to the oil well pumping science. The original liner pump was developed by Daniels and at one time he held patents on various pump parts and accessories.

With Daniels' retirement from active business in 1927, he devoted himself to philanthropic efforts and to the preservation of California landmarks and wild life. Up to the time of his death, he had sent 11 boys through college, paying all of their expenses, but only his intimate friends knew of it. His philanthropies included generous hospital contributions and donations to various libraries.

He leaves a widow, Mrs. Dora Daniels, and a daughter, Mrs. H. E. Cassidy, both of Santa Monica. Interment was at Forest Lawn Cemetery.

Sperry-Sun Announces Change in Personnel

Sperry-Sun announces the resignation of R. L. Marston, regional manager in the Gulf Coast territory, who is resuming his former production activities.

Dwight C. Roberts, regional manager of the Pacific Coast territory, will be transferred from Long Beach, to Houston, from where he will direct and supervise the activities of both the Gulf Coast territory and the Pacific Coast territory.

Mr. Roberts is well known in the petroleum industry. He is a graduate of Stanford University with degrees of A.B. in pre-mining, and E.M. in petroleum engineering. He worked for a number of years as petroleum engineer for the California State Mining Bureau, and later was associated with Neil H. Anderson, California Oil Umpire, in the capacity of petroleum engineer and consultant. He is also well acquainted with the underground well surveying business through his several years association with the Alexander Anderson organization. He has been in the employ of the Sperry-Sun Well Surveying Co. since the early part of 1937.

Dozier-Graham-Eastman Moves to Los Angeles

The Dozier-Graham-Eastman Advertising Agency, an organization well-known in Southern California industrial circles, has moved its offices from the former location in Whittier to new and larger quarters in the Bendix Building, Los Angeles, Calif.

The agency, a member of the National Council of Ellis Plan Agencies and the National Industrial Advertisers Assoc., is one of the oldest industrial agencies in Southern California with over fourteen years of steady growth to its credit. During that time it has directed outstanding campaigns for leading oil tool concerns, for some of the Southland's largest agricultural accounts, and for a diversified list of other clients.

The move to a more central location in Los Angeles will enable the agency to enlarge its service facilities, both for the convenience of those accounts served in various Southern California cities and for its growing list of clients in the Los Angeles area.

Giant clippers for Atlantic service will cross the ocean in a day and a half.

Field Development

San Joaquin Valley

Richfield Enters Cantua Creek Drilling Program

Entering the field of Fresno County exploration near the Western Gulf wells which failed finding commercial production after recovering some 35 gravity oil, the Richfield Oil Corp. has made location for Cantua No. 1. Located in sec. 4, 17-15, the project is but half a mile from the well which found some oil accumulation in the Temblor zone.

Meanwhile the Shell Oil Co. drills ahead below 9600 ft. in gray sand after reporting the top of the barren Eocene at 8900 ft. Known as Port Costa No. 48-30 and located in sec. 30, 17-16, the well has been carefully watched as an index of the drilling program from the north Coalinga field fringe to a point twelve miles north of production.

The Texas Co.'s Loescher No. 1, located in sec. 12, 17-16, is last reported as coring below 8200 ft. in sand and shale after finding the Temblor at 6480 ft.

Nearest of the wildcats to production is the Superior Oil Co.'s S.P.L. No. 1. Possibly shooting for productive sand comparable to the Amerada area zone, the well located near the center of the west half of sec. 15, 18-16, is spot coring below 7300 ft. in shale. No optimistic reports have yet been received from the well.

Arvin Area Gets New Production

Completing it's second well, the fifth of the field, Standard Oil Co. is flowing Jewett No. 2-2. Located in sec. 16, 30-29, the well was brought in June 25th at an estimated 1860 bbl. rate. Gas accompanying the 27 gravity oil flow through 96/64 and 92/64 in. beans was near the 625,000 cubic foot mark.

Standard's Jewett Nos. 2-2 and 2-4 are being pushed ahead. Number 2-4 was spudded just ahead of the 2-2 completion.

The company's southerly outpost, Tupman No. 1, is drilling in sandy hard shale below 3836 ft. Located a little more than half a mile south of production in sec. 22 the test will be carefully watched since the productive extent of the pool is still a moot question.

First northerly extension attempt is getting under way with the pouring of foundations for Richfield Oil Corp.'s Mott No. 1. Location for the project is near the south line of sec. 9 and is an off-set to

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Cantua Creek	Richfield Oil Corp., Turk	1	4, 17-15		Location
	Shell Oil Co., Port Costa	48-30	30, 17-16	9684	Drilling
	Superior Oil Co., S.P.L.	1	15, 18-16	7421	Drilling
	The Texas Co., Loeschner	1	12, 17-16	8247	Drilling
Coalinga	Amerada Pet. Corp., SPL	26-17	17, 19-16	8337	Drilling
	Bandini Pet. Co.	48-18	18, 19-16	6926	Drilling
	Rylatt, Harry E., Kipling	3	26, 20-14	2010	Idle
	Standard Oil Co.	73-19B	19, 19-16		Rigging up
	Stuart Oil Co.	1	12, 21-14	1410	Swabbing
	Superior Oil Co., P.V.	1	22, 20-15	8358	Fishing
	Union Oil Co., Cook	86-18	18, 19-16	1225	Drilling
Fresno Area	Seth Turner	1	4, 14-19		Rig
Gatos Creek	Gatos Creek Oil Co.	1	19, 19-13	100	Idle
	Kern County				
Buena Vista	Gen. Pet. Corp., B.V.A.	1	1, 32-24	6500	Drilling
	Richfield Oil Corp., B.V.A.	81	36, 31-25		Location
	Western Gulf Oil Co., K.C.L., Panhandle	1	3, 32-26	9200	Drilling
Buttonwillow	Calif. Explor. Co., Salisbury	1	7, 29-24	12989	Idle
Devil's Den	Luxton, W. L.	1	27, 25-18	710	Idle
	Emigrant Hill Oil Co.	1	24, 25-18	4271	Fishing
Edison	Siemon, Fred., Metro	1	6, 30-29	4160	Fishing
	O'Rielly, Francis, Edison-Seale	5-27	5, 30-29		Rig
Elk Hills	Richfield Oil Corp.	A-12-33	33, 30-25	8054	Drilling
	Standard Oil Co.	KCL 21-1	19, 30-25	9357	Drilling
Grapevine	Richfield Oil Corp.	KCL 1	28, 11-20	11004	Testing
	The Petrol Corp., Reserve-Petrol	33-5	33, 11-19	8946	Redrilling @7742
Greeley	General Pet. Corp., Sullivan	1	12, 29-25	926	Drilling
Lost Hills	California Lands, Occidental	2	24, 26-20	6070	Drilling
Mt. Poso	Wright & Eyer	1	28, 26-28	1518	Pumping
Richgrove	Crusaders Pet. Corp., Quinn	1	9, 25-27	1475	Idle
	Dilamar Oil Corp., Quinn	3	15, 25-27	2902	Testing
San Emigdio	Bannow, Louis E., Irvin	1	15, 10-23	1900	Drilling
	Continental Oil Co.	KCL F-1	5, 10-21	5953	Drilling
	French Oil Co.	1	14, 10-23	560	Drilling
	Shell Oil Co.	KCL 2A-52	13, 11-22	1920	Drilling
Strand	Continental Oil Co.	KCL D-2	14, 30-36	10657	Drilling
Wasco	Getty, George F., Janssen	1	7, 27-24	10000	Drilling
	Kings County				
Strattford	P. W. Burnham & Assoc., Bartells	1	23, 20-20		Rig

the recently completed Texas Co. Jewett No. 1.

Universal Consolidated Oil Co.'s second well, Universal-Derby No. 2, is reported in oil sand below 6000 ft. Located north of the first well in sec. 15, 30-29 as an off-set to Standard's No. 2-2, the oil sand is reported at 5861 ft. which is 34 ft. higher than in No. 1. The main body of productive sand however was not encountered until 5880 ft.

Superior Oil Co. proposes it's second Arvin well with the location of Cattoni No. 1. The project is to be drilled near the northwest corner of the southwest quarter of sec. 15 as an off-set to established production.

Buttonwillow Wildcat Suspends Operations

Writing at least a temporary finis to a long history of unsuccessful attempts at production, California Exploration Co.'s California Lands - Dougherty - Salisbury No. 1 has been indefinitely suspended. Located near the town of Buttonwillow in sec. 7, 29-24, the project has been under way for eleven months in a seemingly futile effort to produce such tightly packed and impermeable sands as have been encountered. Formation tests have yielded some 35 gravity oil, but for the most part the well has shown little tendency to flow and much of the recovery from all tests was water and mud. On the last test the packer failed and after pulling the tubing an effort was made to drill up the packer which resulted in a twist off leaving the drill collar in the hole. Fishing operations proved unavailing and with the junk still in the hole, the crew was moved from the well.

Total depth of the test is 12,989 ft. with four unsuccessful formation tests having been run from the 11,560 ft. level to bottom.

"No Dope Hole" Fights Fish

Superior Oil Co.'s P.V. No. 1, in section 22, 20-15, midway between the Eocene deep pool and the southerly tip of west side Coalinga production, is in trouble. After making exceptionally good drilling time to the 8358 ft. level, the drill pipe was stuck at 7720 ft. during reaming operations. In an attempt to free the pipe the string parted leaving 36 stands plus the drill collar in the hole. Last reports are that the operators are unable to get hold of the fish. Unconfirmed news from the project places the bottom in gray sand and shale below the barren Eocene. This however is inconsistent with the company's continued operation of the hole.

Two miles east of this hole, near the center of sec. 24, E. A. Parkford has let the contract to drill the Covert property. Work is scheduled to begin at once.

Amerada Tops Gatchell In Second Well

Coring in oil sand below 8270 ft. after topping the Gatchell at 8159 ft., the Amerada Petroleum Corp. S.P.L. No. 26-17, located one position northeast of the discovery well in sec. 17, 19-16, rapidly nears completion. Meanwhile other Amerada Area outpost trys are busily digging ahead.

Nearest try to established production in its location at the east line of sec. 18, 19-16, is the Union Oil Co.'s Cook No. 86-18, now below 2000 ft. Drilling near the south quarter corner of the same section Bandini Petroleum Co. is below 6900 ft. with it's well No. 48-18.

First attempt at extending the Amerada area southerly toward the Eocene pool will be made by the Standard Oil Co. Drilling well No. 73-19B on it's sec-

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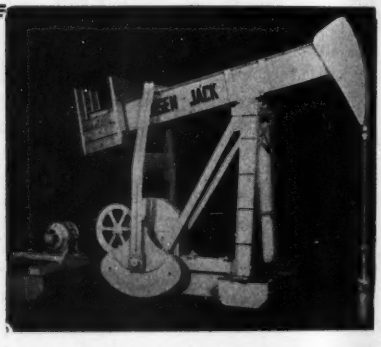

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tion 19, one of many sections Standard holds in fee at the north end of the valley, the company will, by finding production, open many acres of land to the drill.

West Coalinga Gets New Water Well

Nagayama & Haranaga who recently acquired the old Leo Jarvis well in sec. 14, 20-14 ran 4¾ in. casing to 781 ft. with an incomplete water shut off. The well flowed only fresh water on test and is now being converted to commercial water production.

Another west side well which has been tested for a long period and which has yielded to date chiefly water is the Stuart Oil Co.'s Stuart No. 1. Located in sec. 12, 21-14 the well was last flowing 1 bbl. of oil with 20 bbls. of water daily.

A new operator has taken over the old uncompleted Magnet Oil Co.'s Fearon No. 2. Located near the easterly edge of the main body of the west side Coalinga field, in sec. 18, 20-15, the well is to be cleaned out to bottom and deepened. After finding the Gatchell sand absent in this hole the test was bottomed at 4833 ft. in formations reported to be Cretaceous gray shale.

Devil's Den Deepening Job Swabs Salt Water

Emigrant Hill Oil Co. well No. 1, located in sec. 24, 25-18, recently deepened from an unproductive level at 4104 ft. to 4271 ft. is fishing tubing. Claiming oil sand from 4152 to 4193 ft. a formation test of the interval 3750 to 4250 ft. was run. With the tester open 12 hours recovery was 3500 ft. of oily, gassy mud. Three and one half inch liner was then run to bottom and 2½ in. tubing to 3440 ft. Swabbing operations recovered saltwater with a trace of oil and gas.

Wheeler Ridge Well Flows Salt Water

After standing cemented nearly a month while negotiations were completed for 51,000 acres of the Tejon Ranch, Richfield Oil Corp. finally tested KCL No. 1 at Wheeler Ridge only to obtain a 400 bbl. salt water flow.

Bottomed at 11,004 ft., and with 6⅝ in. casing cemented at 10,815 ft., the water shutoff test was questionable, 28½ stands of muddy, fresh water being recovered. On cleaning out to bottom, and setting a formation tester in the casing shoe, the well flowed salt water at an estimated 400 bbl. rate. A water witch is being run to locate the source of the water.

Calif. Lands No. 2 Resumes Operations

California Lands has resumed operations on Occidental No. 2. Located in sec. 24, 26-20, southeast of the company's unsuccessful test Occidental No. 1, the well has been idle some two months. Lying west of the edge of Lost Hills production, the well was drilled to a depth of 5623 ft. before suspension.

Finding the top of Temblor oil sand at 5538 ft., and both zones present in the well, sands from 5615 to 5623 ft. were given a formation test which yielded 3000 bbls. of salt water. After plugging to 5529 ft. for a test of the upper zones the plan was abandoned and the well suspended.

Wasco Test At 10,000 Ft.

Drilling below 10,000 ft. in the Wasco deep hole area, and spudded less than 30 days ago, George F. Getty's Janssen No. 1, has made remarkably good time. Located a half mile west of present proved limits, the test must make another three thousand feet of hole more or less if the pay sands are to be found near the established productive levels. The exact point at which the A-2 oil sands, named after the productive zone in Continental's discovery well, will be found is of extreme interest as an index to the commercial limits of this extremely deep and prolific field.

Texas Co. Completes Eocene Pool Exeter No. 1

Adding another block of definitely proved acreage to the northeasterly flank of the Eocene Pool, The Texas Co. has completed Exeter No. 1. Located near the south quarter corner of the southeast quarter of sec. 6, 20-16, the well was completed flowing through a 24/64 in. bean at a 1337 bbl. rate. The oil, of 30.8 gravity and clean, was accompanied by 830,000 cubic feet of gas. Brought in under wraps, as are all of the Pool wells, the well makes a substantial and long term addition to California reserves.

Cole's Levee Prod. Attempt Hung Up

Attempting a completion of KCL. No. 20-1 the Standard Oil Co. ran into trouble when the line stuck at 9057 ft. Located as a westerly outpost of proven production, the try is located in sec. 9, 31-25 and has reported the top of the oil sand as 8430 ft., which is some 1500 ft. higher than the top in Tide Water Assoc. Oil Co.'s recent completion, KCL. No. 61, some two miles to the southeast.

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Howard Failure Is Keen Disappointment

A keen disappointment to the oil fraternity was the failure of Howard Oil Associates' outpost test to obtain production south of the Rosecrans field. With the fluid swabbed to below 6000 ft., very little oil and no water entered the hole. According to Vernon King, engineer for the Averill interests who now control the project, three lines of procedure are now open. The present open interval, 7552-7644 ft. may be acidized, washed or wall-scraped; the well may be deepened in search of more oil sands or the hole may be plugged and the casing gun perforated in an effort to produce sands now cased off. The well is standing idle pending a decision on which course to follow.

South of the Howard well, King & Weymouth are drilling ahead in Averill No. 2 below the 6500 ft. level. Some observers believe this well to have a better chance for production due to its southerly location.

Across Compton Blvd. to the north, Southern California Petroleum Corp. recovered a drill pipe fish and is making new hole below 3000 ft.

Montebello Boom Hits New High

With 28 strings of tools actually drilling and nearly that many more preparing to start, Montebello is experiencing its greatest activity since the discovery of deep west end production a year ago last January. The comparatively unspectacular Fifth and Sixth zones, with their rapid decline, failed to catch the imagination of the operators as has the Seventh, which definitely appears to be the most prolific yet uncovered in the field. Not only has the Seventh zone much more "kick" than those above, but its areal extent promises to be much greater, many predicting that final limits will go beyond the intersection of Oak and Washington Aves. toward the west, while toward the east, leasing is active as far as the river.

Conservative engineers sound a warning, however, that production is not yet assured east of Union Oil Co.'s La Merced No. 30 which found all sands barren except the 7-4 zone which it discovered precipitating the present drilling rush. The well showed evidence of faulting or other disturbance that may cut off all production to the east, as in Standard Oil Co.'s deep test, Baldwin No. 82, to the north.

Under pressure of court orders obtained by the State, curtailment in the field is now practically 100%, production now being below 13,000 bbls. against 16,000 a few weeks ago with fewer wells on production. The orders were issued because of the excessive gas wastage of Seventh zone wells whose gas-oil ratio is very unfavorable due to a high pressure gas sand.

Although most of the recent completions have been wells of Standard and Union Oil Cos., the independents have also scored. Stanley Oil Co. brought in its No. 1 well located near the corner of Maple and Beverly Blvd. flowing nearly 1600 bbls. of 43 gravity oil and 7,000,000 cu. ft. of gas. Two hundred and fifty feet of formation is open to bottom at 7620 ft.

Masser No. 2 was completed by Herley-Kelley Oil Operations at 7625 ft. at the rate of 1250 bbls. a day. The well

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Castaic	Lang, Ed. W., Rupy	1	7, 5-16	355	Drilling
Inglewood	Vanguard Oil Co., L.A.I.	1	29, 2-14		Rig
Mint Canyon	Redwood Oil Co., Mitchell	1	22, 4-15	120	Idle
Montebello, West	Ridge Oil Co., Sea Cliff	1	3, 2-12	8030	Drilling
Newhall	Mangrum and Page, Lintz	1	4, 3-15	352	Idle
Palos Verdes	Rolling Hills Pet.	1	27, 4-14	5522	Drilling
Playa del Rey	Empire Oil Co., Samarkand	1	34, 2-15	6413	Producing
Puente	Stabeck & Assoc.	1	14, 2-10		Rig
San Pedro	Sepulveda Oil Co.	1	23, 5-14	650	Cleaning out
Sunland	Casa Grande Oil Co., Lopez-Lundy	1	1, 2-15		Rigging up
Towsley Canyon	J. E. O'Donnell	1	8, 3-16	5225	Testing
Whittier	C. W. Partridge, Hillside	1	22, 2-11	1780	Idle
	Taylor Drlg. & Prod. Co., Gregg	1	17, 2-11	6058	Idle
	Vulcan Oil Co., Drake	1	17, 2-11		Location
	Orange County				
Costa Mesa	A. V. Oil & Gas Co.	1	16, 6-10	4751	Idle
Dana Pt.	Dana Point Oil Assoc.	1	15, 3-8		Cellar
	San Bernardino				
Carbon Canyon	Carbon Canyon Oil Co.	1	30, 2-8	256	Idle
	John Hokom Oil & Gas Co., Ltd.	1	31, 2-8	2360	Drilling

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Humboldt	The Texas Co., Eureka	3	21, 3-1		Location
Solano	Standard Oil Co., C.P.C.	1	15, 5-2	5540	Drilling
Sutter	Buttes Oilfields, Inc.	5	1, 15-1	5058	Drilling

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is also located in the Maple and Beverly sector.

Taylor No. 2, located north of Lincoln and west of Montebello Blvd., was deepened by Kern Oil Co. from the 6-2 zone at 6250 ft. to the 7-2 zone at 7135 ft. and recompleted flowing at the rate of 450 bbls. a day through a 9/64 in. bean.

Many of the wells now drilling are deepening jobs soon to be completed, making the next few weeks probably the most active in the history of the field, after which the development should settle to a steadier pace. Indications are that the boom will level off some but will last for several months yet.

The map published in this issue of the California Oil World by courtesy of J. R. Pemberton, Oil Umpire, shows graphically the extent of activity in the field. See pages 16-17.

W. Montebello 'Cat Tests Oil Showings

Having penetrated Montebello zones down to the Seventh, Ridge Oil Co. is preparing to test oil showings encountered in the various horizons, according to President Bob Berkey. Bottom of the hole is given as 8030 ft.

West Coyote Well Flows While Fishing

Interest was focused in the West Coyote field recently when Severns Drilling Co.'s west end well, McNally No. 4, flowed at an estimated 100 bbl. per hour rate while circulating oil to loosen stuck drill pipe. Bottom of the hole at the time was 5944 ft. Seven hours were required to kill the flow of 24 gravity clean oil.

After killing the premature gusher, the fish was recovered down to the drill collar which was sidetracked. Drilling is now underway below 6200 ft.

O'Donnell Tests Towsley Wildcat

J. E. O'Donnell is preparing to make a production test after deepening the old Towsley Canyon wildcat to 5225 ft. Little is known of the well except that casing, including 450 to 750 ft. perforated, has been landed and cemented through perforations. Believed to be yet in Miocene, formations were said to be almost standing on end, many dips as high as 80 degrees being reported.

Spudded several years ago, the well has passed through many hands, coming to Mr. O'Donnell a few months ago from the Towsley Canyon Oil Co. which had produced a small quantity of oil from near the 4000 ft. level.

Late Flash—

Standard Oil Co. completed KCL No. 20-1, Cole's Levee westerly outpost in sec. 9,31-25, flowing initially at the rate of 2200 bbls. of 54 gravity oil and 35,000,000 cu. ft. of gas. Total depth is 9216 ft. with 8⅝ in. casing cemented at 8417 ft.

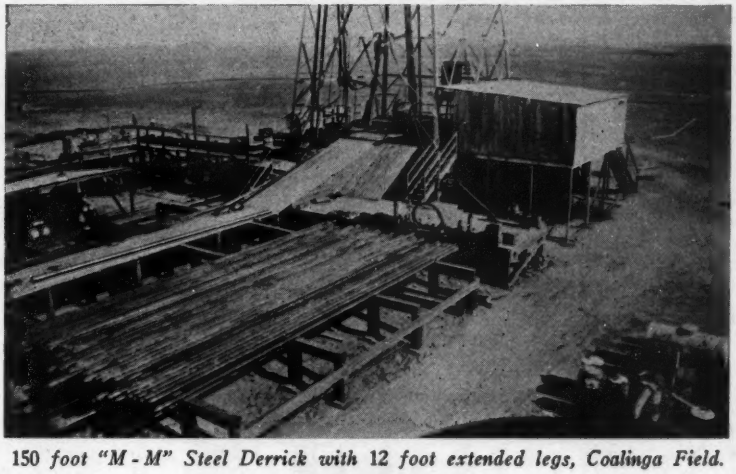
W. Whittier Test Is Again Suspended

Operations have again been suspended in the Taylor Drilling & Producing Co. wildcat, Gregg No. 1 on Beverly Blvd. between Whittier and Pico. Very few showings, none at all of importance, were found to final bottom at 6058 ft.

John Hokom Drills Carbon Canyon Test

John Hokom Oil & Gasoline Co. is drilling its Carbon Canyon wildcat, Hokom No. 1, near the 2500 ft. level. Rigged up with good equipment, the well is making fine time through the hard shales characteristic of the area. Location of the well is in sec. 31,2s-8w in San Bernardino county.

Carbon Canyon Oil Co.'s Schuh No. 1 in sec. 30 is standing idle at 256 ft.



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Huntington Beach Activity Increases

General activity in the Huntington Beach field is on the increase, there being several new projects in the past few weeks. Southwest Exploration Co. is the field's largest operator, following the policy of keeping two strings of tools working at all times.

V. R. G. Wilbur bids fair to eclipse Southwest, however, having staked two new locations and built a new rig for a deepening job. The new projects are Mosier No. 2 and Twining No. 3, both located near the intersection of Summit and Crystal Sts.

On the flat east of the field, H. R. Eyer and Associates have erected a derrick over the long abandoned Standard Oil Co. Newland No. 1. It is planned to first attempt to produce the 4200 ft. zone in which the hole is now bottomed, after which the well will be deepened to the so-called Thompson zone below 5000 ft.

At the corner of Cherry and Orange Sts., Pacific American Oil Co. is drilling a new hole, No. 5, which at last reports was near the 1000 ft. level.

Petromont Oil Corp. bottomed its Five Points well at 4475 ft. and is said to be plugging back to test higher showings. The zone productive in the nearby J. E. F. Oil Co. Bruce No. 1 seemingly was barren in this well.

William Brayton is recompleting his Johnson No. 1A after redrilling to 3292 ft. and cementing 8⅝ in. casing at 2762 ft.

Isco Acquires Harbor Project

Promising further drilling in the easterly section of the Long Beach Harbor field, Interstate Investment Co., headed by Emmett Jones has taken over the undeveloped portions of the General Petroleum Corp. Channel 3 Community Lease lying north of 7th St. Interstate will probably drill the location formerly known as Channel 3 Comm. No. 2 for which derrick was built by General Petroleum.

Rumors persist that Brookline Oil Co. will soon drill the city of Los Angeles lands located west of Ford Ave., but as yet, no official announcement has been made.

After many months of inactivity, Hancock Oil Co. resumed operations in the Long Beach Harbor with the spudding of No. A-21 and the preparations to drill two more.

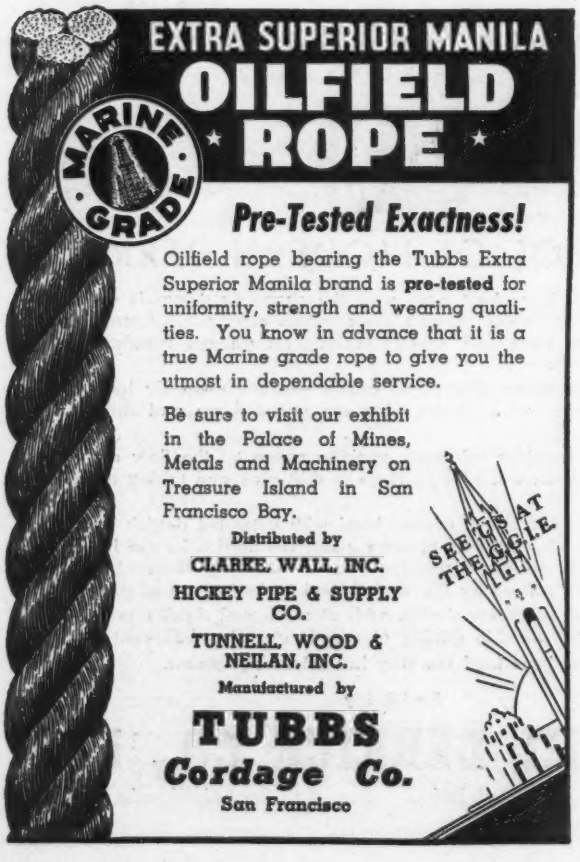
More Ranger zone development will probably take place in the Long Beach end of the field as a brisk leasing campaign is going on in the area immediately south of Anaheim and west of Pico. The territory is semi-proved for the upper zone.

Yet the largest operator in the entire Wilmington field is the Long Beach Oil Development Co. which is developing the City of Long Beach's tideland properties. The company is running nearly a dozen contract strings.

In the Wilmington townlot area, Wilton Oil Co. completed well No. 8 at the corner of "F" St. and McFarland flowing 260 bbls. of 14.5 gravity clean oil from a total depth of 2956 ft.

Rolling Hills Deepens Palos Verdes Wildcat

Rolling Hills Petroleum Co. is deepening its Palos Verdes wildcat, Weston No. 1, at 5550 ft. Formation is reported as hard brown shale showing a little oil and gas. The project, worked intermittently for the past eighteen months, has encountered just enough oil showings to make it interesting. Weston No. 1 is located south of Highway No. 101 at the north end of the Palos Verdes uplift and is said to have intersected the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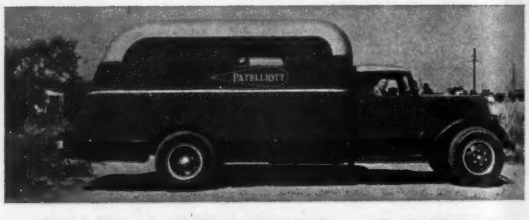

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main fault whose surface is a little to the south.

Atop the high hills back of San Pedro, Sepulveda Oil Co. is preparing to deepen the well drilled to 650 ft. last winter by R. T. Grady.

Dominguez Outposts Attract Attention

At opposite ends of the field, outpost wells draw the major part of Dominguez interest. Selbar Oil Co. recompleted its southeasterly edge No. 2 well pumping 125 bbls. a day after deepening to 4400 ft. while Union Oil Co. is continuing to extend the field to the northwest with good producers.

Bren Oil Seeks New Torrance Extension

Having completed a rig on the west side of Main St. between Lomita Blvd. and Sepulveda Blvd., Bren Oil Co. is preparing to drill in hope of extending the old Torrance field to the east.

Del Rey Outpost Pumps 80 Barrels

Empire Oil Co.'s Playa del Rey outpost, Samarkand No. 1, was completed on the pump at the rate of 80 bbls. a day. The oil is clean and of 22.5 gravity. Seven inch water string was cemented at 6215 ft. in the nodular shale, and the hole was bottomed at 6413 ft. after penetrating 143 ft. of the basement schist.

Casa Grande Spuds Sunland Wildcat Well

Casa Grande Oil Co., a new concern headed by Charles Moose, has just spudded in its Sunland area wildcat, Lopez-Lundy No. 1. Located at the mouth of Lopez canyon, the project is the first to get started of several new tests scheduled for the San Fernando Valley.

At the westerly end of the valley, Fernando Oils, Ltd. and Continental Oil Co. are expected to start work soon on their intended tests.

Coastal District

Wildcats Active in Santa Barbara County

Santa Barbara County is the scene of several of the State's most interesting wells.

In the Bicknell area, near the old Santa Maria field, Hogan Petroleum Co. is working on Zabala No. 1. Located in sec. 33, 9-34, the well drifted from vertical and had to be plugged back to a shallow level for redrilling after once attaining a depth of more than 2800 ft. It is reported that at its lowest point, the drill was still in Sisquoc formation.

On the San Marcos lease in sec. 20, 6-29, seven miles southeast of Santa Ynez, Richfield Oil Corp. has spudded its No. 2 well with heavy equipment, evidently intending to carry the project to a far greater depth than the 1961 ft. No. 1. The first test was drilled with a light, portable rig and was suspended because of caving hole difficulties. A few showings were encountered, but no real body of oil sand.

Only active well in the Los Olivos district is United Western Oil Co.'s Bradley No. 1 in sec. 15, 7-30 which is fishing bit cutters at 3880 ft. Reports persist that the well has penetrated over a thousand feet of basement rock.

Seeking a westerly extension of the old Lompoc field, Sun-Bell Oil Co. is rigging up heavy equipment to resume operations. The well is located in sec. 29, 8-34.

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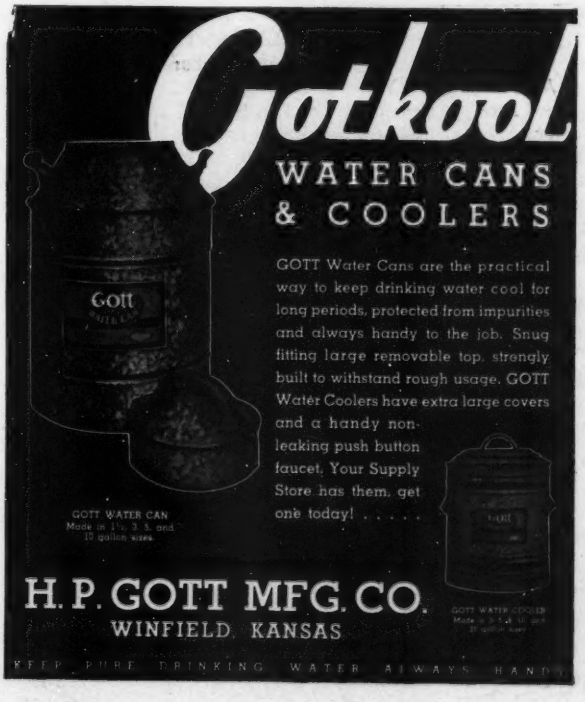
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brown shale in his Corporation No. 1 in sec. 21, 9-33, east of the old Santa Maria field. Although some showings have been encountered at 6625 ft. the well had not found anything which looked commercial.

Fred Cole abandoned his Guadalupe test, Ferrini No. 1, after attempting a formation test of the interval 4450 ft. to bottom at 4753 ft. The packer failed to hold, causing a recovery of only drilling fluid. Bottom of the hole is in Franciscan schist.

General Petroleum Corp. has been held up with the redrilling of More No. 4 in the Goleta gas field by twisting off and leaving 3400 ft. of drill pipe in the hole. Originally bottomed at 4757 ft., new hole had been made to 4100 ft.

Wells now idle but expected to resume operations include Barbara Pacific Oil Co.'s Arnold-Apache No. 2 in the Carreaga area, Litho Oil Co. at Capitan, and Topeka Oil Co., Permit No. 17-1 at Summerland.

Independents Active at Ventura Avenue

More than at any time in recent years are independent company activities coming to the forefront at Ventura Avenue. The discovery of new northside zones by General Petroleum Corp. and Lloyd Corp. opened new territory to drilling which is held by smaller operators.

First to profit by the new discoveries was Alliance Petroleum Corp. which obtained an excellent well on the Hisey lease near the Avenue. Shortly after, British American Oil Producing Co. brought in its first California production by completing No. 7 on the Bolsa Chica Hartman lease.

Ralph B. Lloyd, who long has believed that good yields could be had on the north flank of the easterly end of the field, proved his point when his second prospect well blew in unexpectedly while circulating oil to loosen drill pipe stuck on bottom near the 10,000 ft. level.

Considered to have a good chance of further extending the field to the north. California Alliance Petroleum Corp. is preparing to drill its Hartman Ranch No. 1 as an offset to an undeveloped portion of the Tide Water Associated Oil Co.'s Hartman lease.

Speik Oil Deepens Chappuis 1 at Sespe

Last reported below 3775 ft., Speik Oil Co. is deepening Chappuis No. 1 in the Sespe country of Ventura county. The well is located in sec. 33, 5-19 and was formerly a small producer at 3635 ft.

Two Wells Test Shiells Canyon Area

Two wells are making interesting tests in the Shiells Canyon Area. El Rancho Oil Co. plugged Elkins No. 3 from 3730 ft. to 3350 ft. where sufficient oil was recovered on an open hole test to warrant the running of a liner.

Galveston Oil Co. Basola No. 1, idle for some time at 3140 ft., has plugged to 3000 ft. and is testing for production after cementing 7 in. casing at 2815 ft.

The Texas Co. is directionally redrilling Shiells No. 137 at 2750 ft. after plugging back from 3270 ft.

Coronet Oil Starts East Ojai Test Well

On properties acquired from Capitol Crude Oil Co., Coronet Oil Co. is starting a new test well at the east end of the old Ojai fiields. Known as Capitol Coronet No. 1, the new well is located in the northwest quarter of sec. 16, 4-21 and adjoins old production.

New Mesa Well Pumps 100 b/d

David M'Divani again justified his faith in the Santa Barbara Mesa field with his recent completion of Trans-Oceanic No. 3 pumping 100 bbls. a day of 15.5 gravity oil cutting 5.0%. Seven inch casing was cemented at 1527 ft. and bottom was plugged from 1579 to 1574 ft. where 67 ft. of 4¾ in. liner including 47 ft. of perforations were landed.

Santa Maria Well Flows 1812 Bbls.

Building up from an initial of 1100 bbls. a day, Union Oil Co.'s latest Santa Maria completion, Frank Vicente No. 5 was last reported as flowing 1812 bbls. a day. The oil is free of water and tests 15 gravity, API.

The Frank Vicente lease is located in the westerly central portion of the field in sec. 21, 10-34.

Hopper Canyon Well Pumps Oil and Water

Completed on the pump at 2502 ft., J. A. English's Lankershim No. 2 is pumping an unestimated quantity of oil and water to the sump. Mechanically, teh well is finished with 8⅝ in. water string cemented at 1381 ft. and with 1280 ft. of 6⅝ in. liner landed at 2500 ft. The liner is perforated from 1572 to 2052 ft. and from 2180 to 2500 ft. and was cemented through perforations at 1570 ft.

Safety award for one of the best driving records of the past year—494,417 miles without an accident—was won recently by an oil company fleet in the N. Y. area.

COASTAL COUNTIES WILDCATS

Santa Barbara County

Area	Well	No.	Section	Depth	Status
Bicknell Area	Hogan Pet. Co., Zabala	1	33, 9-34	2815	Drilling
Capitan	Litho Oil Co., Rhode I.	1	4, 4-30	3015	Idle
Carreaga	Barbara Pacific Oil Co.	A-A 2	8, 8-33	6820	Idle
Foxen Canyon	Richfield Oil Corp., Tinaquaic	1	36, 9-32	5541	Idle
Goleta Gas Area	Gen. Pet. Corp., More	4	15, 4-25	4757	Redrilling
Guadalupe	Cole, Fred Ferrini	1	15, 10-35	4753	Abandoned
Orcutt	O. C. Field Gas. Corp.	1	21, 9-33	6610	Drilling
	So. Calif. Drlg. Co., Houck	1	9, 9-33	5002	Idle
Lompoc	Sun-Bell Oil Co.	1	28, 8-34	100	Rigging up
Los Olivos	United Western Oil Co.	1	15, 7-30	3885	Drilling
San Marcos	Richfield O. Corp., San Marcos	1	20, 6-29	1961	Idle
Summerland	Glenray Oil Co., Glenray	1	1, 4-26	90	Idle
	Oil Group, Inc., Hyland	1	16, 4-26	1315	Idle
	Topeka Oil Co.	17–1	22, 4-26	1770	Idle

San Luis Obispo County

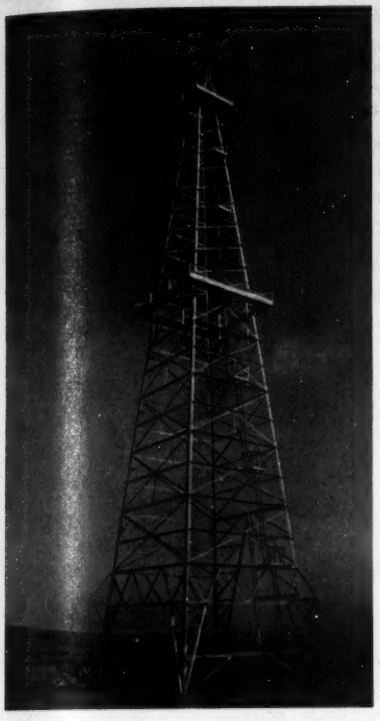
Elk Horn	Calif. Pet. Prod., Irons	1	19, 10-24	2350	Drilling
	Newton, S. M., Stafford	1	18, 31-21	3275	Drilling
	Temblor Oil Co.	1	22, 31-21	3465	Idle
Paso Robles	Epco, Inc.	1	27, 26-13	5660	Idle

Ventura County

Red Mountain	Martin, J. W.	3	15, 4-21	1900	Idle
Sespe	English, J. A.	2	13, 4-19	2502	Pumping
	Nevada-Fortuna Oil Co.	1	13, 4-19		Rig
	Speik Oil Co.	1	33, 5-19	3771	Drilling
Shiells Canyon	Galveston Oil Co.	1	5, 3-19	3140	Plugging
	Shomy Oil Co., Shomy	1	32, 4-19	825	Idle
Simi	Levesque, G. M.	1	17, 2-18	2210	Idle
Tar Creek	Section 20 Oil Co.	1	20, 5-19	2900	Drilling

150-ft. Derrick Features Large Floor, Finger Areas

A 150-ft. steel derrick which provides space on the floor and at the finger comparable with the giant derricks used on exceptionally deep drilling projects

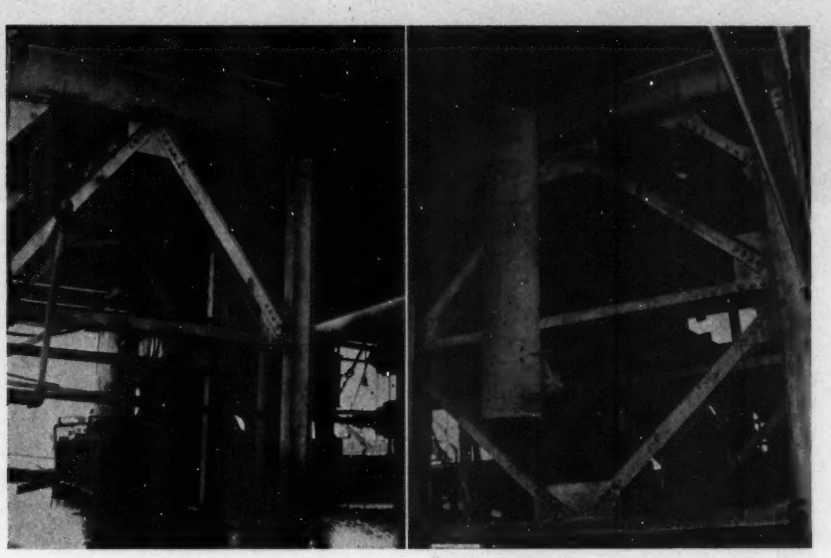


The new 150-ft. M-M steel derrick designed to provide larger floor and fourble board areas.

has been designed by the Steel Oil Derrick Co., Ltd., Los Angeles. Available with standard bases or with continuously extended legs for use with the modern steel substructures, the new derricks meet A.P.I. load specifications in excess of 300 to 400 tons.

Areas of 32 ft. square at the base and 18 ft. square at the fourble board, provide ample space for more and longer pipe stands, larger traveling blocks, swivels, hooks, etc., and with a wide margin of safety for men and equipment.

In the newest installations, the extended legs have been used in conjunction with a steel substructure. The use of the comparatively inexpensive substructure affords an option as to the floor height and provides for stacking pipe on four sides of the derrick floor. The heavy beams comprising the floor structures eliminate the many small piers used in standard construction, and thus provide ready access for the handling of completely assembled christmas trees or blow-out preventers under the most trying circumstances. The additional clearances provided in the steel substructure



Left: Showing clearances under pipe set-back. Floor height 12 ft. Right: The side opposite the drawworks, knee braced and "K" braced.

permit the greatest margin of safety in leaving the cellar in the event of trouble when performing dangerous tasks under the rig floor.

In some cases the substructure has been raised to heights of eleven to twelve feet for the purpose of grade level installation of prefabricated flooded suction mud tanks, thus lessening the load on the heavy pumps. The standard height for smaller installations has been eight feet, which provides ample space for under floor rotary drives.

The derrick is specifically designed for drilling jobs from 7500-10,000 ft. though these specifications by no means limit the derrick to a definite zone. The derrick assembly will perform adequately in any depth hole; it's limit being only the ultimate weight of pipe.

Champion Line Taken By H. & B. Sales Co.

The "Champion" line of equipment has been contracted for by H & B Sales Co. Ltd., of Long Beach, Calif., to manufacture and sell to the trade in California and by distributors throughout the world.

Oil men will remember, the company says, that the "Champion" was the original steel hose to be designed and built, starting in 1928 and how the sales were built up into hundreds and were shipped to every oil field, domestic and foreign.

Although the hose has been improved steadily, the present design is considered to be decidedly superior. Its patented feature allows a three plane swiveling action, making it impossible to become bound in a stiff position. Due to its tapered roller bearing joints, it is free and easy in action even under high pressure. Its paramount feature is the fact that it can be repaired or repacked in the field at nominal cost and in a very short length of time by unskilled labor.

The "Champion" line also includes low and high pressure swing and swivel joints for refinery, loading and other industrial applications, tubing and casing heads and flow beans. Each in turn, like the hose, is designed and built from the users standpoint, for simplicity (fewest possible parts, such as the tubing head having only three parts and no bolts), for economy and for quick and easy repairs when necessary.

Dependability Is Key To Wire Rope Success

"Life Hangs By A Thread" is the arresting title of a booklet which leaves no doubt as to the importance of reliability in wire rope, and continues with a reassuring introduction to the men who are responsible for the high quality of Macwhyte Wire Rope. Operators cannot fail to find this publication interesting. Copies are available at the Kenosha, Wis., offices of the Macwhyte Co.

Metallic Coating

Protection for machines during the breaking-in process is a unique phosphate coating which transforms a metallic surface into a crystalline phosphate layer.

Integrated with the metal underneath, the protective layer burnishes quickly, holds lubricating oils, and prevents corrosion.

L A U G H T H I S O F F

We were very much amused on the night of the fourth to hear our host, a big strong virile petroleum person, asking his diminutive wife for permission to go out on the front lawn with the kids and celebrate Independence Day.

Which recalls **Tom Taggart's** story of the irritable operator who snarled, "Say you! You've been on that phone for a half an hour and you haven't said a word." "Ssh!" says the guy at the receiver, "Can't you see I'm talkin' to the boss?"

Tom, you will remember, was the Irish immigrant who when he first landed in Los Angeles, found endless groups of workers tearing up the streets as usual, and when he was later asked how he liked the town, replied, "It's shure goin' to be swell when it's finished."

And when the first rousty inquired, "Can you lend me five bucks for a week, old man?" the second one answered, "What weak old man?"

Bill Pemberton had just been introduced to a new operator, and to start the conversation he asked, "Are you in favor of curtailment?" "Absolutely," was the prompt response. "What is your reason?" continued Bill, hoping to get some ammunition for future use. You could have stunned him with an erroneous potential when the producer piped, "Heck, I've only just made my decision. I haven't figured out no reason yet."

Bill, incidentally, used to illustrate the perspicacity of oil men as a class by recounting the story of his visit to the home of a well known petroleum magnate. It was Saturday afternoon and he found the aforementioned magnate in a welter of profanity and perspiration. He was in the process of digging a great hole ten or fifteen feet deep right in the middle of the yard, and upon inquiry, Bill found he had put up a swing for his children and discovered that the ropes were too long.

Speaking of swings you will be interested to learn that the creaking of the walking beam was the original inspiration for swing music.

And in spite of the safety consciousness of the industry, **Val Cassidy** claims that he heard a plant foreman exhorting the operators to put a little more fire in their work.

An archaeologist has discovered in northern Canada a kit of tools that is believed to be 18,000 years old. Wonder if they were in a second hand car!

On the subject of tools, **George Thompson** points out that many a guy who has the courage to call a spade a spade hasn't got the energy to take one up and dig.

By the way, did we ever tell you **Clarence Froome's** yarn about the new hand who was given the job of sharpening a circular saw in the machine shop? After he had been at it for several hours, Clarence asked him if he had finished. "Heck no," he said, "I haven't got half the nicks out yet."

Now comes an interesting eight hour report filled in by a conscientious line walker after his first day's work:

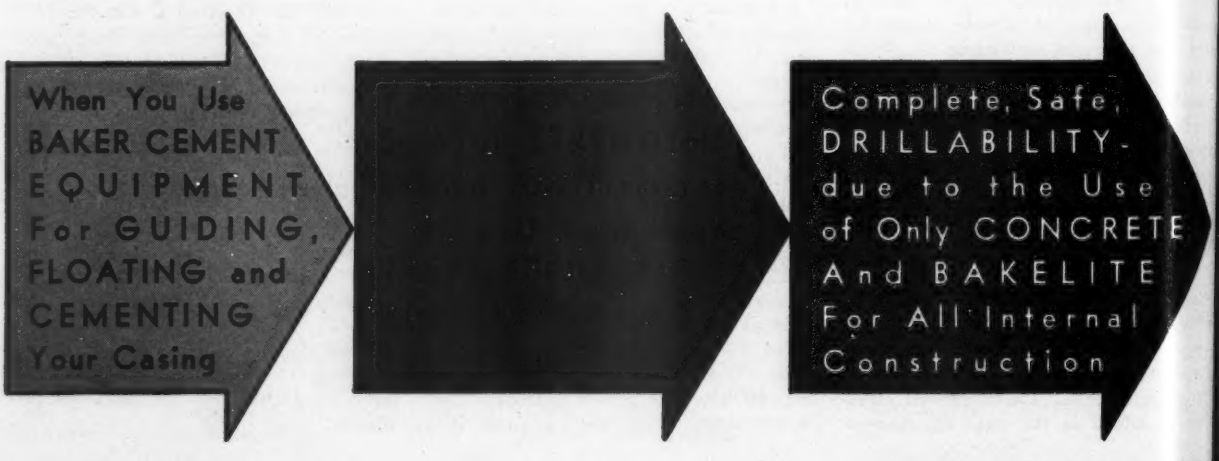
Number of bell holes dug..... 9
Number of pin holes plugged.....23
Number of saddles attached..... 4
Number of miles traveled.....84
Number of days I will continue this work 0

And we are told by Lloyd Kinney that a little dairy out Hynes way has a placard out front carrying the injunction, "Try our butter. Nobody can touch it."

Ralph McGoey says it was so cold back in Texas last winter one of his lads had his appendix removed and it hasn't thawed out yet.

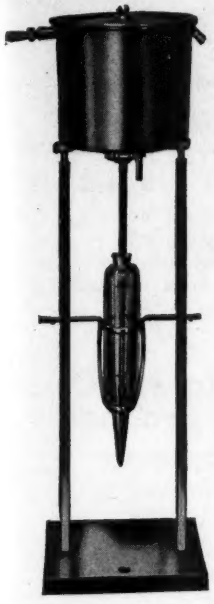
Which reminds us of the lad who didn't know what kind of summers they had in the Canadian middle west because he was only there eleven months.

Saying which we conclude another remarkably illuminating session, as the landlady remarked when she pulled the switch on the light meter.



Constant Head Elutriator Is Introduced by Baroid

The new A.P.I. approved Elutriator of the Baroid Sales Department for determining the percentage of sand entrained in a drilling mud incorporates several changes over previous designs which experience and research have disclosed as necessary.



The most important change is in the water reservoir which is now provided with a water inlet and outlet or overflow tube for maintaining a continuous flow of water and a constant head on the mud being tested. This is essential particularly for those muds that are at least partially flocculated because they require a great deal of washing before the clay and sand separation is effected.

Analyzing the sand content is important due to the fact that excessive sand may cause considerable damage to drilling equipment by abrasion and will impair the wall-building properties of a mud so as to cause the deposition of a thick filter cake with consequent interference with the passage of tools and casing.

The principle of the Elutriator is based on the ability of water flowing at a fixed rate to transport grains of insoluble material that does not exceed 200 mesh. All materials coarser than this mesh remain in the tube and represent the amount of abrasive sand in the drilling mud. The percentage by volume is read direct from the scale engraved on the glass elutriation tube.

A stopcock directly beneath the reservoir permits a restriction in the initial flow rate of the water. If the water were allowed to enter the tube at full force at the start, the rate with which the colloidal material would be carried away would be sufficient to also carry away some of the abrasive sand.

The new Elutriator with the exception of the rubber jet tube connection and the glass elutriation tube, is constructed of Duralumin with an alumilite rustproof finish. The new style framework affords rigidity capable of withstanding oil field usage. It is also easily dismantled for utmost portability.

Announce New Line of Stainless Electrodes

A complete line of stainless steel electrodes covering all chemical analyses, claimed by the manufacturer to be an advancement in uniform, high-quality weld deposits, is offered by The McKay Co., Pittsburgh, Pa.

These electrodes are known as McKay Certified Stainless Electrodes and the makers state that each package contains a certification of weld deposit analysis rather than the wire analysis which has been the practice of manufacturers in the past.

Further claims for superiority are as follows: (1) Instant contact upon restriking arc. (2) Maximum ease of slag removal. (3) Spatter free within practical limits. (4) Exceptionally smooth bead with perfect weld contour. (5) All alloys contained in core wire.

A sixteen-page booklet describing the certification process of weld deposit analysis and the welding procedure for the various stainless steels may be obtained by writing the sales office of The McKay Co. at York, Pa.

Brown Instrument Head to New Government Post

Richard P. Brown, who was recently appointed by Governor Arthur H. James to be the first Secretary of the new Department of Commerce of the Commonwealth of Pennsylvania, is known to you as the former president and now chairman of the board of the Brown Instrument Co. and vice-president of Minneapolis-Honeywell Regulator Co.

Mr. Brown has been interested for some years in the industrial development of Pennsylvania, with the objective of increasing the number of jobs in private industry and thereby reducing the relief load and in turn the taxes necessary to support those on relief.

The new Department of Commerce is not only to aid Pennsylvania's industries in their successful expansion and development, but it was also authorized by the Commerce Law to recommend future legislation to the Pennsylvania Legislature which can be of help to Pennsylvania industries.

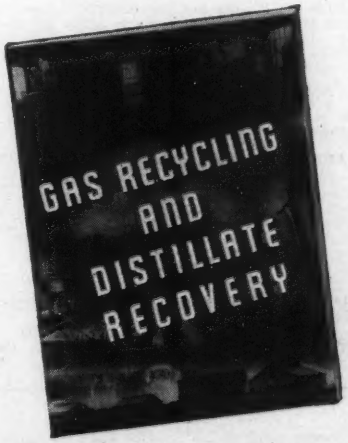
Mr. Brown's past business training of thirty years devoted to the manufacture

Richard P. Brown

of measuring and controlling instruments for use in industry, should stand him in good stead in his new position as Secretary of Commerce of Pennsylvania.

Story of Gas Recycling And Distillate Recovery

Clark Bros. Co. of Olean, N. Y., manufacturers of gas engines and compressors, have recently published the hand-



some booklet shown here telling the complete story of gas recycling and repressuring and distillate recovery. Copies of the booklet may be secured by writing to the company.

Addition of 1% molybdenum to low carbon pressure vessel steel practically doubles its strength at 475°C. and up.

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MAPS

Large maps of Los Angeles Basin oil fields and map showing all California oil fields. Price $15.00 each on paper and $20 each on cloth. Individual state oil and gas maps of Mid-Continent and Rocky Mountain regions. Maps show geological cross sections at base. These maps indicate wells drilling, wells producing and abandoned, with depths.
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MAPS

New colored San Joaquin Valley map, showing oil & gas fields, also all wildcat wells, both old & new, with status June, 1939. Three-foot size, paper $7.50, cloth $9.00. 4½-foot size, $15.00. Earl M. Price & Co., Box 533, Bakersfield. 8-5-d

Oil Men's Calendar

C.N.G.A. Meeting First Thurs. Each Month.

July

10-17—American Institute of Mining & Metallurgical Engineers, Regional Meeting, San Francisco, Calif.

October

4-6—American Institute of Mining & Metallurgical Engineers, Petroleum Division, Galveston, Tex.

9-10—American Gas Assn., Annual Convention, New York.

16-20—National Safety Congress and Exposition, Chalfont-Haddon Hall, Atlantic City.

Week of 16—40th Annual National Automobile Show, Grand Central Palace, New York.

Week of 16—National Tax Conference, Palace Hotel, San Francisco, Calif.

19-20—American Institute of Mining & Metallurgical Engineers, Petroleum Division, Los Angeles, Calif.

November

8-16—National Motor Truck Show, Navy Pier, Chicago, Ill.

13-17—American Petroleum Institute, 20th Annual Meeting, Stevens Hotel, Chicago.

California Crude Oil Production

Two Weeks Ended June 24, 1939

	June Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Belridge—North	13,353	11,849	*1,504
Belridge—South	2,180	1,080	*1,100
Buena Vista	17,476	16,424	*1,052
Canal	5,283	5,814	531
Coalinga-East (Eocene)	6,250	6,330	80
Coalinga—East-West	16,214	7,126	*9,088
Edison	2,160	2,118	*42
Elk Hills	7,828	10,462	2,634
Fruitvale	6,232	5,940	*292
Greeley	3,059	2,229	*830
Kern Front	7,651	6,967	*684
Kern River	8,389	2,570	*5,819
Kettleman No. Dome	35,297	53,231	17,934
Lost Hills	4,140	3,099	*1,041
McKittrick	3,930	3,929	*1
Midway	38,506	39,312	806
Mount Poso	10,565	10,470	*95
Mountain View	8,923	9,210	287
Rio Bravo	7,250	7,498	248
Round Mountain and Coffee Canyon	8,178	8,262	84
Ten Section	9,059	9,145	86
Wasco	1,255	1,214	*41
Other Fields	3,216	3,409	193
TOTAL	226,394	227,688	1,294
Coastal Counties			
Elwood	3,580	3,919	339
Rincon	2,584	3,759	1,175
Santa Maria	8,496	3,356	*5,140
Gato Ridge	2,450	2,719	269
Santa Maria Valley	21,519	12,401	*9,118
Santa Paula-Newhall	5,545	5,633	88
Ventura Avenue	30,317	38,159	7,842
Other Fields	5,242	5,285	43
TOTAL	79,733	75,231	*4,502
Los Angeles Basin			
Alamitos-Seal Beach	6,850	6,832	*18
Brea-Olinda	8,369	5,617	*2,752
Coyote—East	3,062	2,305	*757
Coyote—West	10,274	9,167	*1,107
Dominguez	16,108	17,723	1,615
El Segundo	3,245	3,246	1
Huntington Beach—New and Old	22,275	26,718	4,443
Inglewood	12,655	13,622	967
Long Beach	41,774	45,038	3,264
Montebello	6,137	6,232	95
Montebello-West End	7,022	15,426	8,404
Playa del Rey	4,861	5,162	301
Richfield	7,855	8,318	463
Rosecrans-Athens	9,972	11,608	1,636
Santa Fe Springs	25,945	28,319	2,374
Torrance	5,560	5,366	*194
Torrance "34" and "D & B"	11,331	13,557	2,226
Wilmington	75,447	81,189	5,742
Other Fields	3,332	3,829	497
TOTAL	282,074	309,274	27,200
STATE TOTAL	588,201	612,193	23,992

*—Shortage.